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Enhancing Intended Learning Outcomes via Web 3.0: A Focus on University Students' Self-Directed Learning

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Dedication

This humble academic fruit is dedicated to my beloved wife, my angel Malak, and my new born baby Rana

This journey's product is also dedicated to my parents

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Research Vision

The philosophy of this research dissertation is to pave the way for university students to have a say in the teaching-learning process. Such a say can be reached through the academic incorporation of Web 3.0 Applications synchronously and asynchronously.

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List of abbreviations and acronyms

ALO	Actual Learning Outcome
ANOVA	Analysis of Variants
AUI	Al Akhawayn University in Ifrane
CEFR	Common European Framework of Reference
EFL	English as a Foreign Language
EST	English as a Second Language
ILOs	Intended Learning Outcomes
LMS	Learning Management System
LTD	Language Training Detachment
MA	Master of Arts Program
MIU	Moulay Ismail University
SDL	Self-Directed Learning
SMBAU	Sidi Mohamed Ben Abellah University
SPSS	Statistical Package for Social Sciences
SRSSDL	Self-Rating Scale of Self-Directed Learning
SWOT	Strengths, Weaknesses, Opportunities, Threats
WBSL	Web-Based Self-Learning
WWW	World Wide Web

List of statistical symbols

Symbol	Symbol Name	Meaning / definition
$P(A)$	probability function	probability of event A
$P(A \cap B)$	probability of events intersection	probability that of events A and B
$P(A \cup B)$	probability of events union	probability that of events A or B
$P(A B)$	conditional probability function	probability of event A given event B occurred
$f(x)$	probability density function (pdf)	$P(a \leq x \leq b) = \int f(x) dx$
$F(x)$	cumulative distribution function (cdf)	$F(x) = P(X \leq x)$
μ	population mean	mean of population values
$E(X)$	expectation value	expected value of random variable X
$E(X / Y)$	conditional expectation	expected value of random variable X given Y
$var(X)$	variance	variance of random variable X
σ^2	variance	variance of population values
$std(X)$	standard deviation	standard deviation of random variable X
σ_X	standard deviation	standard deviation value of random variable X

Symbol	Symbol Name	Meaning / definition
\tilde{x}	median	middle value of random variable x
$cov(X,Y)$	covariance	covariance of random variables X and Y
$corr(X,Y)$	correlation	correlation of random variables X and Y
$\rho_{X,Y}$	correlation	correlation of random variables X and Y
Σ	summation	summation - sum of all values in range of series
Mo	mode	value that occurs most frequently in population
MR	mid-range	$MR = (x_{max} + x_{min}) / 2$
Md	sample median	half the population is below this value
Q_1	lower / first quartile	25% of population are below this value
Q_2	median / second quartile	50% of population are below this value = median of samples
Q_3	upper / third quartile	75% of population are below this value
\bar{x}	sample mean	average / arithmetic mean
s^2	sample variance	population samples variance estimator

Symbol	Symbol Name	Meaning / definition
s	sample standard deviation	population samples standard deviation estimator
z_x	standard score	$z_x = (x - \bar{x}) / s_x$
$X \sim$	distribution of X	distribution of random variable X
$N(\mu, \sigma^2)$	normal distribution	gaussian distribution
$U(a, b)$	uniform distribution	equal probability in range a, b
$F(k_1, k_2)$	F distribution	
$n!$	factorial	$n! = 1 \cdot 2 \cdot 3 \cdot \dots \cdot n$

Abstract

Web 3.0 stands for a semantic Web, which is a transformative version of Web 2.0. The semantic Web is changing the phase of communication, and university teachers should be aware of its educational impact, especially within the framework of the strategic plan 2015-2030. Web 3.0 becomes more and more ubiquitous among university students, yet it has not found its way to educational landscape in Moroccan higher education. This dissertation scrutinizes the way teachers' use of Web 3.0 enhances students' self-directed learning (SDL) as an element of Intended Learning Outcomes (ILOs). For this purpose, a sequential exploratory mixed-method is used. The first sequence is an online questionnaire administered to students from three Moroccan universities, the second sequence is an online questionnaire administered to teachers from the same institutions, and the third sequence is an experience of teaching with Kahoot as a Web 3.0 App. Based on DigComEdu Model, the findings through the three sequences display that students are highly satisfied with the use of Web 3.0 technologies, yet teachers rarely or never integrate these technologies in their teaching process.

مقتضب

يحول Web 3.0 على الشبكة الدلالية، ويتعلق الأمر بإصدار تحويلى من Web 2.0 الى Web 3.0 التي غيرت، ليس فقط من الطرق التي أصبحنا نتواصل بها في أيامنا هذه بل حتى في الكيفية التي نتعلم بها في المؤسسات التعليمية اليوم. ولعل تأثيرها الإيجابي على العملية التعليمية ككل جعلها تنتشر بشكل كبير جدا. وينبغي أن يكون مدرسي الجامعات مدركين لتأثيرها التعليمي وخاصة في اطار الرؤية الإستراتيجية للتعليم 2015-2030. لكن على الرغم من اتساع رقعة استعمال الويب 3.0 بين طلاب الجامعات، فهذا الإصدار بقي محدود التوظيف في المشهد التعليمي في المغرب. وتهدف هذه الرسالة إلى تسليط الضوء على الطرق التي يستعمل بها الأساتذة للويب 3.0 لتطوير مهارة للتعلم الذاتي (SDL) لدى الطلاب كعنصر من مخرجات التعلم (ILOs). لتحقيق هذا الهدف، يتم استخدام طريقة استكشافية متدرجة مختلطة. تم في مرحلة أولى توزيع استبيان عبر الإنترنت قام به طلاب من ثلاث جامعات مغربية ، أما المرحلة الثانية فهتمت أساتذة من نفس الجامعات حيث تم استبيانهم أيضا عبر الانترنت، أما المحطة الثالثة فهي تجربة التدريس باستخدام Kahoot كتطبيق ويب 3.0. استناداً إلى نموذج DigComEdu ، تُظهر النتائج من خلال المراحل الثلاث المدروسة أن الطلاب جد راضين على استخدام تقنيات الويب 3.0 كوسائل ناجعة في العملية التعليمية التعليمية وفي دعم طرق التعلم، فالأساتذة على العكس من ذلك، نادراً ما يلجؤون إلى هذه التقنيات في عملية التدريس رغم أثرها الإيجابي على المتعلمين.

General Introduction

“We live in a world of technology. But, it is not the technology that is mobile. It is you” (Microsoft, 2017).

New technologies through Web 3.0 as a semantic Web become more and more omnipresent among university students, yet they are still fighting for their path into the educational platform. In this Web wave where different users are obviously amusing (and sometimes ‘abusing’), universities are still lagging behind and ignoring its usage to allure students’ retention and motivation to remain involved in classroom activities (Levesque, 2012). Indeed, Web 3.0 popular platforms such as Webinar, Edmodo, Evernote, and Kahoot offer an emerging social networking practice, collective intelligence and a natural context to promote learner independence in informal English Language Learning and Teaching (Dörnyei, 1988).

First, SDL stands for “the process by which individuals take the initiative (...) in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes” (Knowles, 1975). Self-directed learning is “a process that implies motivation to learn, monitoring, reflecting, judging, planning, and evaluating personal progress against a standard” (Zimmerman, 2005, p. 57).

Second, Web 3.0 is one of the most pervasive means by which university learners frequently communicate (Lee, Cheung, & Chen, 2005). Web 3.0 technological instruments contribute to developing collaborative learning (Gao & Tsai, 2013) that underlies a social cognitive view of self-directed learning, which paves the way for an autonomous learning¹

¹ Autonomous learning and self-directed learning are used interchangeably throughout this paper

enabling the learner to evaluate their learning goals in order to acquire knowledge and skills (Pintrich et al., 1993 and Zimmerman, 1998).

Indeed, it is believed that language practices via Internet-related technologies can contribute to students' academic proficiency, develop their intercultural awareness, and thus deepen their motivation (Lounsbury, et al.,2009). Undeniably, blogging, surfing, chatting, and podcasting in English as a foreign language is implicitly associated with learning how to communicate in English. However, to realize the affordances of Web 3.0, it must be integrated carefully into the curriculum and linked clearly with learning outcomes and learning, teaching, and assessment activities (Hoven, 1999; Stockwell, 2007; Brown, 2011; Levy, 2014). Web 3.0 can heighten self-directed learning through endorsing learner activity, independence, and commitment (McLoughlin & Lee, 2010).

According to Nor, Hamat, Azman, & Noor (2012) and Woo & Arnold (2011), Web 3.0 applications provide possible ground for supporting self-directed learning. This, in turn, endows insightful and valuable academic investigation (Boruta, et al., 2011; Mortimer, 2010); Shihab, 2008). Accordingly, the collaboration within a community and a sense of belonging to a community are important to enable Web-based self-directed EFL learning. Thus, when individuals are motivated to learn, it is possible for them to perceive affordances, limitations and strategies for active learning (Gaviria et al., 2013). In other words, it is mandatory to incorporate technology to resolve pedagogical issues (Chambers, 2006; Bax, 2011; Beetham, 2007; Boulton, 2008). The use of tools such as blogs and e-portfolio require the consideration of self-directed learning. This involves the student being able to establish a self-directed learner identity and knowledge manager in order to ensure academic proficiency (Evans, Mulvihill, & Brooks, 2008; McLoughlin & Lee, 2008; Evans, & Kinnane 2008; Dippold,

2009). Rogers (1969) insists on the role of the teacher as facilitator and on the students' learning autonomy. Yet, much of the literature on Net generation has focused on 'technicalities' rather than the educational phase (McCarty & Hukai, 2005; Stanley, 2006; Young, 2011).

Hence, Web-based self-learning (WBSL, henceforth) has become increasingly popular due to the wide diversity of materials available online. The development of Web 3.0 technology, which provides an efficient platform for individuals to share and exchange experience and knowledge, is a key to this success (Churchil, 2009; Kerawalla, et al., 2009; Kim, 2008, Kim et al., 2012). Accordingly, learners manage to choose which learning materials to opt via the Internet and thus become self-oriented in different settings (Burden & Parker, 2008).

Nevertheless, the dramatic growth in the amount of material has also brought about the problem of cognitive overload, which may lead to disorientation and significant learning difficulties (Mayer & Moreno, 2003; Sweller & Chandler, 1998; van Merriënboer et al., 2003). Although a few studies have investigated cognitive load in instructional designs, the issue of incremental information of Web 3.0 to cognitive load may remain unresolved (Morrison & Anglin, 2005). Thus, how to tackle the cognitive overload in Web 3.0 seems vital to the success of online learning, especially in a WBSL environment.

One of the constraints of enhancing English language skills, mainly speaking and listening, was the lack of valuable equipment. Now thanks to Web 3.0, many useful audio-visual devices are available to support language teachers and learners. (Levy, 2014) and (Liang, 2010), for instance, refer to many online beneficial resources that can be used by language educators in the sense that they facilitate learning and encourage students to feel

motivated especially when they are allowed to use their own mobile devices. They can also ease in managing and monitoring student progress Sweller & Paas, 1998).

Moreover, some scholars make it clear that a binary opposition between the ‘real’ face-to-face and the ‘virtual’ Internet-mediated life needs more exploration within the framework of communicative competence (Scollon, 2004; Kress, 2006; Thorne et al, 2009). Web 3.0 technologies could play an important role in this context. Becker (2010), for instance, cited at least four key benefits for Web 3.0 use in education: (1) increased commitment to the learning task, (2) increased independence and motivation for self-directed study, (3) enhanced self-esteem, and (4) improved behavioral habits. Generally, many studies are found to refer to ICT but rarely to Web 3.0 technologies, especially when it deals with learning proficiency (Cavanagh, Reynolds & Romanoski, 2004).

Furthermore, as pointed by Kenski et al., (2013) and Hussein (2014), Web 3.0 technologies provide fast and easy access to information, allowing people to follow the changes of a world in permanent evolution. The influence of these resources on education cannot be ignored. Bringing these resources to the school environment is a way of enriching classroom activities, bringing them closer to the students’ reality and making them more meaningful for the students. It is imperative for teachers to incorporate the use of technologies in their classroom practice in order to create a learning environment adequate for the students’ needs (Warschauer, 2011).

To put it differently, the daunting nature of the learning, teaching, and assessment needs, and the complexity of learning outcomes are the main reasons for strategic integration of Web 3.0 into the curriculum. Technology puts new demands on language teaching (Dutta & Mia, 2011) because in addition to cultural knowledge and entertainment, it includes self-

directed, affective, and behavioral components. Rather than focusing just on content, importance can be placed on learning competencies as a lifelong process, and the ability to notice, reflect, critically analyze, problem solve, and relate to others (Byram, 1997; Kohonen, 2005). Yet, opportunities presented via new educational technologies are inevitably coupled with challenges (Laurillard, 2008).

Essentially, instructors across a variety of academic fields face a new challenge in 21st century classrooms and contemporary educational technology. Indeed, teaching methodologies should cope with this new digital learning individuals. The massive availability of Web links and materials become part of the ordinary truth and has presented a varied set of teaching strategies with applications in student learning. However, the amount and continuous shifting quality of such material can be annoying to educators, which requires an incessant professional development teaching strategies and gaining new Web competencies. Hence, university teachers in both online and face-to-face courses are supposed to adapt to the technologies used by students and gain the computer skills needed to incorporate online tools in their delivery of instruction (Gögüs, Nistor, Riley, & Lerche, 2012).

Basically, recent research shows that Web 3.0 technologies are not only shaping how university students connect to the world and each other but also are affecting their learning and performance (Smith, Salawy & Caruso, 2009; Solomon & Schrum, 2007). For example, Web 3.0 social software tools, such as Weblogs and wikis which allow an individual and social learning practices that help information sharing thanks to social knowledge contexts and learning communities (Alexander, 2006). Additionally, some research evidence suggests that faculty can use social software tools to facilitate student self-regulated learning processes,

such as goal setting, self-evaluation, and help seeking (Kitsantas and Dabbagh, 2010). However, purposeful differentiation among personal, social, and academic use of Web 3.0 technologies remains a challenge for both students and teachers, particularly in higher education contexts.

Research Rationale

According to Rainie & Smith (2013), over a third of all cellphone Internet users 34% in USA are using their phones, rather than a desktop or laptop computer, as a primary tool to access the Internet. With these statistics in mind, it was apparent at the time of this study that there was much to be learned about the ways in which undergraduate students were using these devices for academic purposes.

One of the most crucial priorities in Moroccan universities is the crowded auditorium and low number of students' participation and lack of teachers' formative assessment track. Thus, the rationale behind this study is to provide useful insights into the potential instructional usage of the emerging Web-based technologies. It aims also at examining the possibility of integrating Web 3.0 in parallel with the face-to-face classroom activities. In other words, the proposed research has the potential to contribute to scholarship and practice in the fields of education, measurement, and teaching English as a foreign language. In other words, this study is worth examining for the simple reason that not many published empirical studies have explored self-directed learning and its relationship to Web 3.0 technologies in education.

By inferring the way students use academic Web 3.0 applications, faculty members can instigate to incorporate technological, pedagogical, and content knowledge practices into

their pedagogical approaches (Mishra & Koehler, 2008). Language educators, for example, can benefit from this study to promote TEFL, and incorporation of Web 3.0 technologies in teaching methodologies and establish new pedagogies for teaching. Thus, the study attempts to put forth new teaching strategy using online technological usage in education settings and evaluate how it is associated with self-directed learning.

The emergence and subsequent proliferation of Web 3.0 technologies in educational contexts has resulted in a significant shift towards Web-based learning becoming the main and most preferable mode of learning for many university students all over the world. Thus, recent reports indicate that Web 3.0 applications, at the top of which are social networks, media sharing tools, wikis and blogs have gained explosive popularity and unprecedented uptake among university students globally (Morris, 2011). These new technologies come to be viewed as a giant opportunity to break up with the traditional top down conceptions of learning and move towards more engaging instructional paradigms that place the learners at the center of the learning process.

Research Objectives

This sequential exploratory thesis has a double-folded facet. First, the major purpose of the present study is to explore the relationship between the usefulness of Web 3.0 technologies and self-directed learning as well as the impact of different demographic variables on the same dependent variable. Second, this thesis aims to infer teachers' readiness to incorporate Web 3.0 with the aim to enhance their students' SDL. That is, it aims at investigating Moroccan EFL students' self-directed learning as an outcome using different types of Web 3.0 applications. The focus will then be on EFL Moroccan learners and how their self-directed learning is impacted by the type of Web 3.0 applications used.

By doing so, a further aim of this study is to bring a more recent literature source to the existing literature addressing student and teacher satisfaction and competence in the use of Web 3.0 in the enhancement of students' self-directed learning as an element of intended learning outcomes. Accordingly, the present study targets EFL students and teacher from three schools of humanities in three different Moroccan universities: Sidi Mohamed Ben Abdellah University in Fes, Moulay Ismail University in Meknes and Al Akhawyn University in Ifrane.

Research Gap

University policy has known a number of educational reform efforts, yet no single reform has recommended the incorporation of new technological applications in the teaching process. Web 3.0 has become pervasive; university students have found ways to cope with recent Web 3.0 technologies for many purposes. The rate at which they are using such technologies has been increasing progressively and alluring pedagogical approaches to use Web 3.0 in higher education is necessary. It is thus useful to examine how university students are currently using Web 3.0 Apps, and how their teachers could incorporate these Apps efficiently and effectively.

SDL readiness through Web 3.0 has not received much interest in terms of research. The improvement of self-directed learning seems to be constrained by the fact that the learner is knowledgably equipped with a certain independence competence, which is preserved in a virtual world but is not put into practice in face-to-face context. Thus, learners of English as a foreign language are usually faced with such a binary opposition in the sense that they can be skillful in the virtual conversational communication but are required to be proficient in a real academic setting. Apparently, Moroccan EFL university students are no exception.

While the existence of Web 3.0 technologies is an asset to language teachers and students, even those who are fairly savvy at using digital technology for other purposes may be uncertain of how to exploit these resources effectively for language learning outside class (Barrette, 2004; Hubbard, 2004; Winke & Goertler, 2008) may require a significant amount of learning training. The present research paper addresses Web 3.0 technologies which university students and teachers are familiar with and how they (may) use them to enhance self-directed learning and thus contribute to rendering the university intended learning outcomes a truth (Hubbard, 2017).

General Theoretical Hypothesis

The general theoretical hypothesis of this study supposes that Web 3.0 Apps contributes to enhancing university students' self-directed learning (SDL), which leads to the empowerment of the university' intended learning outcomes (ILOs).

Hypothesis

The present study explores university learners' and instructors' understanding and attitudes to the idea that the incorporation of Web 3.0 Applications could enhance self-directed learning. Based on the questions below, the following hypotheses are formulated:

- H₀: There is no relationship between learners' Web 3.0 interaction and their self-directed learning.
- H₁: There is a significant correlation between learners' Web 3.0 collaboration and their self-directed learning.
- H₂: EFL learners prefer much more virtual interaction rather than face-to-face.
- H₃: Students take initiative and responsibility for learning thanks to the use of Web 3.0.
- H₄: The more students are engaged with Web 3.0, the more achievement of SDL they might enhance.
- H₅: EFL learners select, manage, and assess their own learning activities while using Web 3.0.

Research questions

The problematic of the research paper is that there are new trends such as Web 3.0 technologies that EFL educators ignore and do not take into consideration in the process of instruction. The present research sets out to answer the following research questions:

Q1- Is there any significant correlation between different demographic variables and the use of Web 3.0 as a way of SDL learning?

Q2- Are students and teachers aware of the educational role of Web 3.0?

Q3- Are students and instructors satisfied with the incorporation of Web 3.0 in ILOs?

Q4- Are students and instructors ready to use Web 3.0 in the enhancement of SDL as an ILO?

Anticipated Contribution of the Research

This thesis is supposed to contribute to the pedagogical reform efforts with the purpose of attaining the ultimate university's Intended Learning Outcomes by providing tangible outcomes to university policy makers.

Significance of the Study

At the time of this study, few studies have been done on students' self-directed learning and very limited research has been conducted on the use of Web 3.0, and yet no available common ground research papers have been led to the incorporation of Web 3.0 in classroom activities with the aim of enhancing students' SDL.

University education is still currently lagging behind from not including technology integration in the formal academic setting. Most university students are digitally natives² with at least one mobile device. They use technology as a continuity of themselves anytime,

² Digital natives are people who were born during the emerging of digital age (after 1996) and began interacting with technology.

anywhere learning (Terras & Ramsay, 2012). Students use the Internet to communicate with each other constantly, and yet when they get to class, they are told to put their devices away.

Indeed, there are at least two ways in which this study may have academic significance. First, language educators, for example, can benefit from this study to promote TEFL, and the potential incorporation of Web 3.0 technologies in teaching methodologies and establish new pedagogies for teaching. Second, the study provides new teaching strategy based on online technological usage in education settings and evaluate how it is associated with self-directed learning. Indeed, this study has a practical application for future training model designs used in higher education.

Future Contributions of the Study

This dissertation seeks to bring to light material that could be beneficial to teachers and students about the importance of incorporating Web 3.0 applications in classroom activities. This includes recent instrument that student may have learned about that could have helped enhance their self-directed learning and teachers that may have become better informed of the Apps that students are using, and to apply those Apps in their teaching strategies.

Thesis Structure

This thesis is organized in five chapters in addition to the general introduction and conclusion. The first chapter stands for the literature review and it presents key factors and figures about the DigEduComp Model. It also provides the conceptual framework of the study starting with the Intended Learning Outcomes in general and Self-Directed Learning in specific as well as some of the most education Web 3.0 Apps. Here, the reader is introduced to the theoretical framework in which the present study is carried out. Also, the reader will be provided with a brief account of self-directed learning and the Internet technologies passing

by WWW, Web 3.0 and self-directed learning. Moreover, the chapter presents a general overview of the potential relationship between Web 3.0 and self-directed learning. As a final point, relevant findings are referred to for the sake of comparison.

The second chapter highlights the methodology, purpose and significance of the research paper and how, where and when it takes place. The chapter offers a detailed explanation of the methodology followed in this research thesis and the statistical material executed to examine the hypothesis and research questions. Initially, it draws attention to the hypothetical problem and thus originates pertinent hypotheses. As such, it presents significant questions that will be discussed in detail. Later, the reader is introduced to the sampling of the population under study and the instrument of data collection. In addition, this chapter presents the procedure for data collection and explains the various statistical procedures and measures.

The third chapter is concerned with the end result of the research paper and it gives detailed statistics, clarifies and helps the reader to deduce the result's significance. The latter will then confirm or disconfirm the thesis hypothesis as well as agree or disagree with previous findings. The chapter also provides the reader with an explanation of the approach used to determine the reliability and validity of both quantitative and qualitative data and the results of the study based on major findings of the questionnaires.

The fourth chapter discusses the entire findings of the three sequences and presents some interpretations of the paper's outcomes pertaining to the research questions. This chapter reminds the reader of the four research questions in this study that revolve around the potential contribution of Web 3.0 Apps in the enhancement of university students' self-directed learning, and its use in the ultimate intended learning outcomes.

The fifth chapter suggests some educational implications of the research findings for consideration in higher education as well as a few recommendations for future research to conduct. It provides answers to the research questions. Further, this chapter refers to the limitations of the whole study.

Summary of the General Introduction

Research on the use of Web 3.0 among university students and instructors with the purpose of enhancing SDL as an element of ILOs has not been conducted at this time, nor has a descriptive and cross-tabulation analysis been done connecting the mentioned variables. Inferring the ways in which university students and teachers use new technologies for academic purposes may help educators better understand how to incorporate Web 3.0 approaches into their class activities befittingly. This sequential exploratory study complements the existing research surrounding online learning practices and contributes by building upon the current body of knowledge.

Chapter One: Review of The Literature

This literature review covers general information about self-directed learning (SDL, henceforth) as an element of Intended Learning Outcomes (ILOs, henceforth) (James, 2005) and Web 3.0. It displays an overview of the conceptual framework of SDL as well as how SDL exists as a historical process, a model of learning, and a theory for teachers. The review of literature also provides descriptive data and usage of some Web 3.0 applications and how they can be incorporated in the process of learning. Further, this chapter introduces the theoretical framework on which the study is grounded; that is to say, constructivism and social constructivism.

1.1. Conceptual Framework of the Intended Learning Outcomes (ILOs)

Learning outcomes focus more on the attainment in knowledge and recommend that the course should instigate what students will be able to grasp throughout the learning experience (Allan, 1996). Two key stands of learning outcomes are to distinguish. The intended learning outcome (ILO) and the Actual Learning Outcome (ALO) (Alexander, 2001; Anderson, Moore, Anaya, and Bird, 2005). The former is put down prior to including the learner in the learning setting (Anderson et al., 2005; Harden, 2002; Hussey and Smith, 2003; Jenkins and Unwin, 2005), while the latter is that what the learner reaches following the assessment of each learning activity (Anderson et al., 2005; Hussey and Smith, 2012).

The body of literature reveals that the Intended Learning Outcomes (ILOs) stand for the planned learning outcomes which express the learners' aptitude by the end of each course module. Recently, in their joined article "Intended Learning Outcomes Friend or Foe?" Greensted and Hommel (2014) coin the concept ILOs for the first time and describe it as follows:

... essentially about performance and they are the implementation tools for the objectives. So it is necessary to have both objectives and ILOs. The programme objectives statement is likely to be quite short, stating what the program is aiming to achieve and for whom (p. 22).

Realizing the ILOs in higher education is a current debate inviting online education and learning communities to support the learner in honing the required skill by the end of the course of study. Developing the ILO structure, in which the subject matter and their relationships are integrated with the capabilities to be learned, is a challenge to instructional designers.

Three basic elements are comprised within the framework of ILOs, which are Leadership, Autonomy, and Diversity (LAD). First, Leadership is to assume responsibility for actions, which allows all individuals (learners & instructors) to inspire and promote change collectively towards a shared vision or goal (McDermott, 2014). Indeed, leadership means that every individual should be in charge of ultimate task that puts together all individuals' interests. Hersey and Blanchard (2007) define leadership as:

... the consistent patterns of behavior, which you exhibit, as perceived by others, when you are attempting to influence the activities of people. This behavior has been developed over time and is what others learn to recognize as you the leader, your style or leader personality (p. 34).

Such an explanation later reinforces the framework that every individual's leadership style stands different from the other holding different challenges to instructors who seek to welcome leadership among their students.

The most ultimate goals of leadership are to strengthen the self (leader) and others (followers) towards a shared vision of diverse functions, geographies and expertise, to

empower others (followers) for a committed collaboration, and to aspire to the self and others. Second, Autonomy is the ability to take charge of one's own decisions and assume responsibility for consequences as well as to initiate, monitor, and evaluate learning outcomes (Knowles, 1984; Dang & Robertson, 2014). Autonomy's outcomes are to demonstrate awareness of the opportunities to exercise self-directed decisions, to explain rationale of these decisions, and to practice self-reliance and use available resources for support. Third, Diversity is the inclusion, welcome, and support of individuals of the community. The characteristics can include age, gender, appearance, citizenship, disability, education, ethnicity, family, background, geographical origin, language, marital status, political views, race, and religion (Harrison & Klein, 2009). Thus, diversity's outcomes are to recognize and explain the value of diversity society and in other groups or communities, to demonstrate willingness to investigate others into the community (university), and to challenge unfair and uncivil behavior in other individuals or groups.

In short, an ILO begins "by the end of the course [when] the learner will be able to [accomplish] X and Y", where X is capability and Y is subject matter content (Gilbert and Gale, 2007). An ILO is normally expressed in terms of the plain text that defines the learning objectives of the course of study (Gilbert and Gale, 2007; Kennedy & Archambault, 2012).

1.1.1. On the Concept of Leadership

Leadership is seen as a process of mutual communication and influence between leaders and followers (Barnard, 1968; Jacobs, 1971); or a process of engaging with others to achieve a defined group and organizational goal (Banaszak et al., 2011). Yukl (1989) speculates that leadership is the nature of the influencing process as well as its resulting end that occurs between a leader and followers, and how this process is explained by the leaders'

dispositional behaviors, follower perceptions of the attributes of the leader, and the context in which the influencing process occurs. Leadership then stands also for the ability to step outside one's cultural context to start evolutionary change processes that are more adaptive (Caligiuri, 2006), yet (Northouse, 2018) sees leadership as a process whereby an individual could influence a group of individuals to achieve a common goal.

All the above definitions suggest several components and assumptions central to understanding leadership. These include but are not limited to: (a) leadership is a process with an observable interaction, (b) leadership involves influencing others, (c) leadership takes place within a context and within a context of a group, (d) leadership involves goal achievement, and (e) these goals are shared (both in setting and achieving) by leaders and their followers. (Fry, 2003)

Three distinct leadership styles appear in literature: (1) 'authoritarian', (2) 'democratic', and (3) 'laissez-faire'. At one end of the spectrum, the authoritarian leader is described as one that has absolute decision-making over his/her employees. The laissez-faire leader is described as the most nondirective and noninvolved leader. At the opposite end of the spectrum, is the democratic leader (characterized by transformational leadership practices) who strives to engage others in the decision-making processes (Eagly et al., 2003). Different situations or environments may require specific use of a certain leadership style; however, transformational leadership (Seashore et al., 1999) has been most frequently identified with effective nursing leaders.

1.1.2. On the Concept of Diversity

Diversity is generally defined as the existence of differences among members of a social unit (Jackson, May & Whitney, 1995). The language of diversity which was once so

heavily dominated by phrases like “affirmative action” or “equal opportunity” has now been replaced by “diversity management” or “outreach recruitment” (Schwartz, 1996). Organizations have made their commitment to diversity evident in their business practices, marketing, and selection of diverse employees. Organizations have also made a business case for diversity, arguing that diversification of the workplace is a necessity for increasing workplace innovation and creativity (Cox & Blake, 1991 and McLeod et al., 1996).

In connectivism terms, Downes (2010) shares his understanding of diversity as follows.

....the system of education and educational resources should be structured so as to maximize diversity. The intent and design of such a system should not be to in some way make everybody the same, but rather to foster creativity and diversity among its members, so that each person in a society instantiates, and represents, a unique perspective, based on personal experience and insight, constituting a valuable contribution to the whole (p. 351).

Researchers are divided on the issue of whether diversity should be conceptualized as a demographic characteristic or viewed as an abstract idea with a limitless number of choices (Hays-Thomas, 2004). In this vein, diversity can be visible, such as race, age, or gender, or can be an underlying trait, such as educational background, job attitudes, or personal values (Ely & Thomas, 2001; Harrison, Price, & Bell, 1998; Jackson, May, & Whitney, 1995; Lau & Murnighan, 2005; Pelled, 1996; Tajfel & Turner, 1986; Turner, 1999).

1.1.3. Defining Self-Directed Learning

This section provides an overview of SDL in terms of historical and functional definition of SDL as a concept, as a process, and as a model. It shows different definitions and scientific descriptions of the concept of SDL. Such definitions are presented in terms of

a chronological order starting from Roger (1969), passing by many authorities such as Knowles (1975); Brookfield (1986); Boud (1988); Candy (1991); Robothan (1995); Garrison (1997); Zimmerman (2001); Merriam (2010); and arriving to Macaskill and Denovan (2014). The section also sheds the light on SDL as a process and to Garrison's Model of SDL, which is the basis of this study. Yet, the main conceptual framework that the majority of scholars agree upon is that the SDL stands for a responsible learner who can select and prioritize her/his learning goals and activities.

1.1.3.1. On the Concept of Self-Directed Learning

The concept of SDL stands for individuals who recognise their learning needs, take the initiative in learning, determine learning goals, put down appropriate learning strategies, and evaluate learning outcomes. This cannot be grasped without a trustful partnership between the instructor and the learner.

To begin with, Rogers (1969) insists on the role of the teacher as facilitator rather than an authoritative tutor. He recommends that the students' learning autonomy should be enhanced. His belief is that the learners should realize their own potential while given appropriate opportunities.

Few years later, Knowles (2014) first coined SDL and describes it as

The process by which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and

implementing appropriate learning strategies, and evaluating learning outcomes (p. 18).

Within the same view, Okabayashi & Torrance (1984) claim that SDL requires some basic features of learners who are involved in the process of learning. Such characteristics comprise competencies to “sense the relevant and important information in a task; access source information; think independently and follow instructions and rules; recognize and accept responsibility for one's learning; and self-start a task” (p.51). Thus, the SDL learner is “one who has arrived at a self-concept of being responsible for one’s own life, of being self-directing” (p. 9).

Other scholars go deeper and provide a detailed description concerning a self-directed learner. The latter is, for example, referred to as a mature learner who “sets learning goals, locates appropriate resources, devises learning strategies, and is responsible for evaluating the progress made toward the attainment of those goals would be engaged in self-education or self-directed education rather than self-directed learning” (Brookfield, 1986, p. 25). The concept of SDL advanced in Brookfield (ibid), stands for the clue of individuality, which means the ownership of a recognition and consciousness of a variety of different options. Hence, one can infer that a self-directed learner is aware of his/her learning personal power. Yet, Brookfield (1999) warns that SDL does not mean that the learners are free to carry out any and/or every activity in whatsoever means they choose.

Within the framework of tutoring activity, the key elements of SDL are said to stand for the approach to how learners learn, how much they have learned, what their limitations are, how they concentrate on the course, when and from whom they can attain support and how they understand the objectives of the learning processes. Before, the instructor used to

be responsible for conveying information and making most of these choices. Thanks to the active learning, which has recently emerged, the responsibility of the learning process belongs to the learner who take the ultimate responsibility in making choices for himself/herself. Accordingly, learners are challenged to learn by their own effort rather than relying holistically on instructors (Brandes & Ginnis, 1986).

Furthermore, SDL comprises elements of “independence, dependence, and interdependence,” (Boud, 1995, p. 25) and it conceptualizes these positions on a learning scale of student beginning from a position of being dependent on the teacher and moving through independence to interdependence. Boud (*ibid*) elucidates that SDL refers not only to a learner’s goal facilitated by the teacher, but also to an educational curriculum. He praises the idea that students who are dependent on their teachers are by no means less productive than those who have developed autonomous learning which empowers them to discern and make use of their own resources for learning. Such a concept juxtaposes with Ouakrim’s description of a self-directed learner as an ‘AIR’ (Autonomous, Independent, Responsible) learner (Ouakrim, 1999, p. 34).

By the same token, “if students are denied opportunities to participate in decision-making about learning, they are less likely to develop the skills they need in order to plan and organize for life-long learning which depend on their decisions about their learning needs and activities.” (Boud, 1995, pp. 21-22).

Then, Tough (1989) states that learners like better take up responsibility for planning and directing their learning activities provided they have the chance. This stands in stark contrast to Knowles’s (2014) assertion that SDL is not a choice, but rather a requirement for survival. He states that:

The “why” of self-directed learning is survival—your own survival as an individual, and also the survival of the human race. Clearly, we are not talking here about something that would be nice or desirable; neither are we talking about some new educational fad. We are talking about a basic human competence—the ability to learn on one’s own—that has suddenly become a prerequisite for living in this new world. (pp. 16-17)

Further, some scholars start in the early 1990s empowering SDL and argue that the learner performs better when s/he learns at her/his own pace. Such an outperformance can be attained with or without the assistance of the instructor (Knapper & Cropley, 2000) and the “self-direction in learning refers to both the external characteristics of an instructional process and the internal characteristics of the learner, where the individual assumes primary responsibility for a learning experience” (Brockett & Hiemstra, 1991, p. 24). The latter insured that every individual is equipped with a certain degree of SDL.

Additionally, Candy (1991) agrees with Boud (1988) in the sense that SDL targets to both objectives which learners seek to attain under the assistance of teachers; and to an approach of conducting courses. However, Candy disagrees with Boud in such a way that the former warns that it cannot be assumed that studying using self-directed methods results in the learning being self-directed while the latter suggests that if students have the opportunity to learn to be independent learners this is likely to be carried in practice.

Confessore (1992), on the other hand, stipulates that “Self-directed learning, as with any human endeavour, becomes a matter of drive, initiative, resourcefulness, and persistence to see ourselves through to some level of learning that is personally satisfying” (p. 3). Similarly, Wilcox (1992) urges students to incessantly update their skills and thus develop their SDL skills. She explains that over the past few decades, attention has been paid to

learning that needs to occur without the benefit of constant interaction with teachers. She admits that all learners are endowed with a never-ending prospective for improvement and evolution. Thus, instructors can better lead and accompany such improvement without interfering in the adjustment of the process of learning.

As to some contemporary academics like (Robinson & Bennett, 2003) acknowledge that the learner who improves some basic academic skills via SDL approach will understand her/his own learning activity and decipher the way to develop such activity so that s/he can swap this vital understanding to upcoming SDL experiences (Robotham, 1995). The latter draws attention back to the characteristic of SDL as a facilitator for further self-initiated learning. Increasingly, this implies that the learner will be able to infer what motivates her/him to self-direct her/his learning, and the best routes to be “self-awareness.”

Accordingly, students who possess characteristics of SDL possess “learning self-awareness” (Robotham, 1995, p. 5). These students own “an appreciation and understanding of how they learn, of their learning capabilities, and of the outcomes that they want to achieve” (p. 3). SDL was considered as “an approach where learners are motivated to assume personal responsibility and collaborative control of the cognitive (self-monitoring) and contextual (self-management) processes in construction and confirming meaningful and worthwhile learning outcomes” (Garrison, 1997, p. 19).

Another viewpoint is that Taylor (1997) does not agree with Boud (1995) as he considers the continuum too linear for professional education or practice. Yet, he praises Knowles' vision about the adult learner who can take responsibility for learning, by becoming autonomous, independent and thus self-directing learner. Here, the instructor is involved in a course of reciprocal search with the learner rather than conveying a particular knowledge

(Pilling-Cormick, 1997). The overriding framework of the SDL process is that students direct their own learning.

Besides, the main skills that contribute to improving students' aptitude to involve in this autonomy in learning are "reading skills, deep-level approaches to learning, comprehension monitoring, the ability to ask questions, and critical thinking" (Kreber, 1998, p. 75). Zimmerman (2005), in this regard, conceptualizes SDL as one's "self-generated thoughts, feelings, and actions for attaining academic goals" (p.17). SDL is a merged method where the learner observes and regulates his/her activities so as to accomplish the looked-for ending and it is a 'self-directive process.'

Akerlind & Trevitt (1999) believe that the "shift to more self-directed, computer based learning is often seen as requiring additional skills of students in taking greater responsibility for their own learning" (p. 97). The authors claim that SDL is a successful teaching method especially in adult education.

Pintrich & De Groot (2000) stipulate that SDL is a dynamic and constructive approach in which learners predominantly plan to achieve certain objectives and then they attempt to trace, direct and control their perception, their drives and their performances led by their aims and the basic background features (Sansone & Smith, 2000).

Again, Zimmerman and Schunk (2001) highlight the crucial role of SDL in academic achievement. They explain how SDL, as a lifelong learning process, could regulate the learners' thoughts, feelings and actions in order to attain higher academic performance. Equally important, many authority scholars agree with Zimmerman and Schunk (2001) on the point that "student perceptions of themselves as learners and their use of various processes to regulate their learning are critical factors [to SDL] in analyses of academic achievement" (p.

12). Further, Zimmerman and Schunk (p. 15) delve into SDL research and elucidate that it strives for exploring how the individual seeks learning techniques to develop her/his academic performance, and it attempt to find out how such a learner adjusts herself/himself to changing circumstances.

Hence, it seems clear that SDL puts emphasis on autonomy and control of learners who observe, direct, and regulate actions toward their goals for self-improvement (Paris & Paris, 2001). Self-directed learners are aware of their strengths and weaknesses, and they control and regulate their own actions towards their learning goals.

To put it differently, Zimmerman (2001) does not separate autonomous learning from mental aptitude and academic performance skill. Instead, he proclaims that it refers to a self-directed process through which learners transform mental abilities into task-related academic skills. As such, Zimmerman (2002) advocates three main aspects of SDL. First, “forethought” which implies that the learner is able to set up objectives and design the techniques. This first, and most important, aspect incorporates “self-efficacy, outcome expectancies, intrinsic interest/value, learning goal orientation.” Second, “performance” whereby the learner is able to control and instruct herself/himself. S/he can concentrate more and differentiate between levels of her/his academic experiences and strategies. Third, “self-reflection” which entails that the learner is able to not only judge and evaluate her/his outcomes, but critically react to those outcomes as well (Vallerand, 2007).

Another key point is that O’Shea (2003) argues that the notion of SDL is associated with that of self-regulation, self-sufficiency and self-control. Learners with SDL skills entail “control, regulation, internal and external motivation and success during learning activities and experiences.” (p. 64). He believes that:

personal control by the learner over the planning, monitoring, and management of the learning. Furthermore, what also appears common to most definitions is the notion of some personal control by the learner over the planning and management of the learning. (p. 63)

Other scholars describe SDL as the prospect where the learner becomes in full charge of the “planning, carrying out, and evaluating their own learning experiences” (Ellinger, 2004, p. 159). So, the learner “will take responsibility for his or her own learning and more often chooses or influences the learning objectives, activities, resources, priorities, and levels of energy expenditure than does the other-directed learning” (Guglielmino & Guglielmino, 2004, p. 11).

Then, Woolfolk (2004) discusses how SDL helps learners to be aware of themselves and trust their own abilities. The learner will thus be able to decipher the subject matter, the assigned tasks, the learning strategies, and the learning context. The learners are intrinsically motivated and, thus, can individually rate not only their academic performance but also their learning process. Hence, learners become empowered to prevent themselves from loss and failure (Baker, 2004). In fact, learners who are able to control their own learning experiences can certainly convey what they have learnt in today’s scientific context in which interdisciplinary studies are of great importance and thus perform greater number of operations during their own learning processes (Boyer & Kelly, 2005).

As stated earlier, SDL is “a process that implies motivation to learn, monitoring, reflecting, judging, planning, and evaluating personal progress against a standard” (Zimmerman & Kitsantas, 2005, p. 99). SDL is a goal and a process, where the instructor becomes a facilitator who grants a ‘life-long learning’ among learners.

Most compelling evidence, tutors, in business and medical field, have incorporated SDL in their learning process because they believe it gives birth to learners who can manage their own learning throughout their careers (Greveson & Spencer, 2005). The latter considers that the idea of SDL is an “accord with western ideals of democracy, individualism and egalitarianism. It is also seen as a prerequisite for life-long learning” (p. 351). Later, the reader is reminded of Knowles’ view in that SDL is described as a course of “learning in which people take the primary initiative for planning, carrying out, and evaluating their own learning experiences” (Merriam, Cafarella, & Boumgarnter, 2010, p. 110).

Emotionally, SDL is said to be a crucial factor in learners’ control of emotions; learners possess optimistic feelings and hope as well as enjoy learning (Pekrun et al., 2010). Therefore, they feel proud as they can control their anxiety and monotony. With this in mind, SDL is also perceived as “a learner’s autonomous ability to manage his or her own learning process, by perceiving oneself as the source of one’s own actions and decisions as a responsibility towards one’s own lifelong learning” (Sze-Yeng & Hussian, 2010, p. 19). Thus, self-directed learners take initiative related to their own learning with or without instructors’ escort.

In this regard, Cassidy (2011) claims that the concept of SDL is becoming progressively more significant in the field of learning and academic achievement, particularly in higher education, where the learner is required more autonomy and responsibility. From his part, Brookfield (2013) states that SDL cannot come to the surf unless the learner chooses what to learn, when to learn it, how much to learn, and whether something has been learned well enough. His viewpoint implies that the tangible self-directed learner has the power and the control to alter exterior choices in the learning process.

Macaskill and Denovan (2014) suggest that SDL would be good for teaching curriculum since it is recognized as an important predictor of student academic motivation and achievement. It is a pivotal construct in contemporary accounts of effective academic learning. SDL is essential to the learning process by which students direct their acquisition of academic knowledge. Indeed, SDL creates opportunities for students to manage their own resources and to perform better in all learning processes. Self-directed learners take responsibility for their own learning processes and adopt their learning strategies to meet their demands. Students use various cognitive, meta-cognitive, behavioural, motivational and environmental strategies to control and regulate their own learning (Alivernini & Lucidi, 2008).

A close look at a current study by Khiat (2015) confirms the description of Knowles (2014) and approves that SDL is “contingent on the motivation of the learner. Motivation will guide the level of the determination, level of persistence, and effort devoted to achieving them” (p. 2). Within the same vein, SDL has recently received greater thoughtfulness than before in the milieu of higher education. Cadorin *et al* (2016) find out that higher SDL proficiencies are connected to higher curiosity, critical thinking, quality of understanding, retention, recall, and competence, as well as better decision-making and significant learning. SDL is also connected to higher motivation, self-confidence and independence, interpersonal communication abilities, which are well recognized essential components of professional development (Cadorin *et al.* 2016).

Thus far, instructors are invited to be accustomed with the elements that provide a learner with the ability to self-direct and the techniques they can use to detect and sustain SDL

in their classrooms. In short, Self-directed learners should be aware of their strengths and weaknesses, and they can adjust their own actions to actualize their academic goals.

1.1.3.2. On the Process of Self-Directed Learning

Generally, many schools view SDL as a process that is followed by the individual. Mezirow (1981) was credited with the concept of SDL as a process of adult learning. SDL was referred to as “an organized and sustained effort to assist adults to learn in a way that enhances their capability to function as self-directed learners” (p. 94).

A group of scholars claim that SDL is a process that the learner can maintain and hone with the facilitating of the instructor’s training. For example, Brockett and Hiemstra (1991), Knowles (2014), and Tough (1979) argue that learners should be guided to increase their ability to be more self-directed and to take personal responsibility for their own learning (Merriam S. , 2010). Brookfield (2013) also considers SDL as a process by which adults could set goals, locate resources, choose the method and evaluate their learning through critical thinking.

Kirwan, et al. (2012, p. 23) portray the process of self-directed learning as

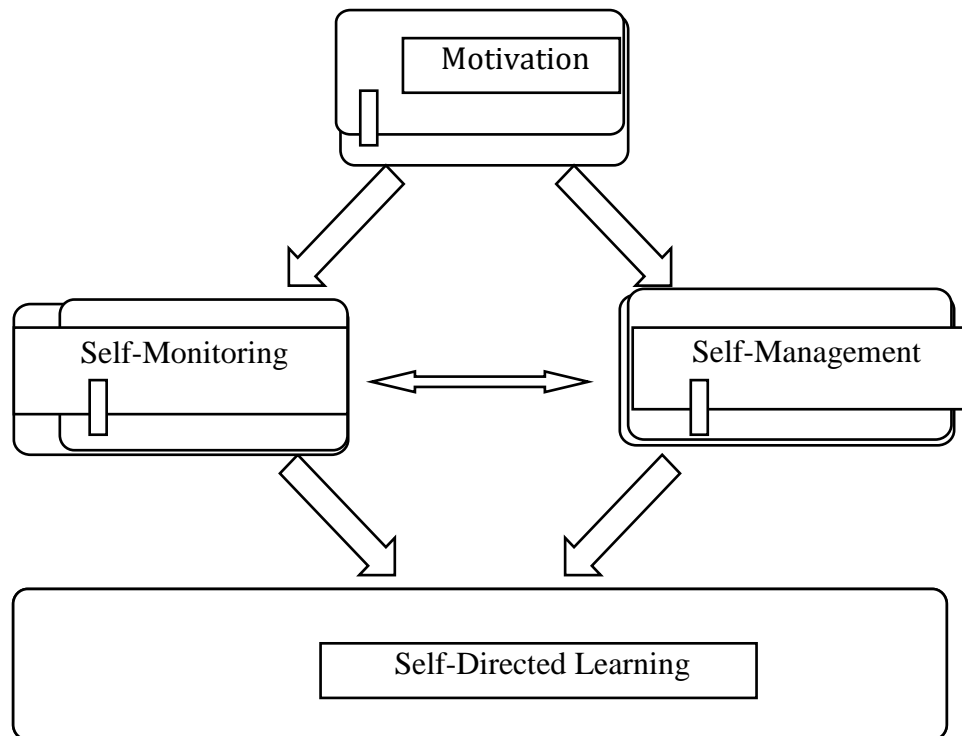
a personality construct reflecting an individual’s preference to be in charge of their learning process; ability to conceptualize, plan, implement, and evaluate their academic experience; and disposition to be goal oriented and to work independently or in group settings with little guidance.

1.1.3.3. On the Model of Self-Directed Learning

The notion of SDL came to be known in the 1970's as a conspicuous model of instruction in adult learning practices. In other words, while Knowles (1975) inaugurates the grounded constituents of the SDL theory, Garrison (1997) suggests the incorporation of three

basic elements to individual learning, which constitute an SDL Model of education. The three elements are “self-management (task control), self-monitoring (cognitive responsibility), and motivation (entering/task)” (p. 20).

Figure 1 Dimensions of Self-Directed Learning Diagram (Garrison, 1997)³



First, ‘motivation’ is a crucial constituent in attaining a learning objective as it is the longing and readiness to learn, which facilitates a smooth link between context (control) and cognition (responsibility) (Garrison, 1997). This implies that learners become responsible for their individual employment and understanding, bringing together new ideas and concepts with prior knowledge.

³ Self-Directed Learning Diagram is developed by Garrison in 1997 as a way learners diagnose their learning needs and goals

Second, “Self-monitoring addresses the cognitive and metacognitive processes: monitoring the repertoire of learning strategies as well as an awareness of and an ability to think about our thinking (plan and modify thinking according to the learning task/ goal)” (Garrison, 1997, p. 22). Accordingly, “the learner takes responsibility for the construction of personal meaning through integrating new ideas and concepts with previous knowledge” (Abd-El-Fattah, 2010, p. 587).

Third, ‘self-management’ means that the learner is able to take control over their social and behavioural accomplishment of the learning goals (Garrison, 1997, p. 21). This dimension is concerned with the performance of the learning goals and the administration and monitoring of learning resources and support.

Hence, learners become more productive if they are more directing their own process of learning and having more power in selecting their appropriate activities (Boyatzis, 2000). This means that the learner can create knowledge if s/he is given the chance to expose his/her skills and experiences and not duplicate the already acquired knowledge.

Furthermore, the instructors are urged to provide learners with some freedom so that they could regulate the suitable practices for learning and to retain the curriculum and learners on the same platform (Robotham, 1995). The latter explains that in whatever SDL experience, instructors must set up a program so that the student can be an efficacious learner. They should provide enough guidance and direction in advance so that students do not get lost. They should also illuminate clearly the goals often so that students can carry out the shift to learning material on their own. In the course of the SDL process, instructors should deliver periodic assessment and recognize prospective deficiencies along the way (Robotham, 1995).

According to Macaskil and Denovan (2014), the self-directed process model is based on the cooperation between students and teachers in such a way that the former gradually improves a certain autonomy for his/her own learning process while the latter supervises and sharpens that autonomy academically. Indeed, SDL necessitates a model swap from ‘teacher-centred approach’ to ‘student-centred approach.’ Macaskil (2014) insists that while SDL can be instigated at any level of study, the adult is the ultimate learner for self-directed model of tutoring.

1.1. Self-directed learning as a process.

Generally, many schools view SDL as a process that is followed by the individual. Mezirow (1981) was credited with the concept of SDL as a process of adult learning. SDL was referred to as “an organized and sustained effort to assist adults to learn in a way that enhances their capability to function as self-directed learners” (p. 94).

A group of scholars claim that SDL is a process that the learner can maintain and hone with the facilitating of the instructor’s training. For example, Brockett and Hiemstra (1991), Knowles (1975), and Tough (1979) argue that learners should be guided to increase their ability to be more self-directed and to take personal responsibility for their own learning (Merriam, 2010). Brookfield (2013) also considers SDL as a process by which adults could set goals, locate resources, choose the method and evaluate their learning through critical thinking.

Merriam and Caffarella (2012) go further to proclaim that SDL could be “an instructional model” that positions the learner in the centre of learning, which makes of them high SDL learners. In addition, Hammond and Collins (1991) propose that the concept of SDL as a personality trait is too limiting and that a comprehensive model includes nine facets that

constitute the process of SDL. The facets comprise “building a cooperative learning climate; climate; analysing the situation; generating a competency profile; conducting a diagnostic self-assessment of learning needs; drafting learning agreements; self-management of learning; reflection and learning; evaluation and validation of learning; and coordinating critical SDL” (ibid., 43).

Other scholars consider SDL as a crucial constituent in an open process for professional development in such a way that adults learn to improve the socio-economic rank, to develop political awareness, and to stimulate social action. Here, Ellinger (2004) talks about the significance of developing SDL as a function of human resource progress process. The role of SDL as an open process has also been shaken by (Jarvis, 1995) and Sze-Yeng and Hussain (2010).

Skager (1979) agrees with Knowles (1975) in categorizing constituents of the SDL process as setting learning goals, identifying resources, and evaluation of goal achievement. Skills have been identified that are commonly used by self-directed learners although the relative importance assigned to these skills varies with the researcher. The individual learner, who is intrinsically motivated, engages in setting learning goals, identifies and accesses necessary learning resources, and performs self-evaluation of learning (Hidi, 2000).

Further, several scholars have found out that the learner can work independently (Knox, 1986) while others have added the social networking as a significant element in emancipated SDL (Tough, 1971).

1.2. Self-directed learning as a characteristic of personality.

Although the majority of researchers have approached SDL as a process, other researchers have framed SDL from a psychological point of view (e.g., Brockett & Hiemstra,

1991; Guglielmino, Long, & Hiemstra, 2004; Long, 1990; Lounsbury, Saudargas, & Gibson, 2004; Oddi, 1986; Skager, 1979). Long (1990) proposes that SDL involves three dimensions, the pedagogical, the sociological and the psychological. He states that the “critical dimension in self-directed learning is not the sociological variable, nor is it the pedagogical factor. The main distinction is the psychological variable” (Long, 1991, p. 132).

Viewing SDL as an attribute of personality has provided a consistent indicator since psychological attributes, such as personality traits, tend to persist from one learning environment to the next (McCrae & Costa, 1997; Oddi, 1987). This has allowed researchers to study the relationship between SDL and other variables. The self-directed learner has been described as one who: has a high degree of self-efficacy; is intrinsically motivated; diagnoses personal learning needs; sets goals based on that diagnosis; chooses appropriate strategies to achieve those goals; self-evaluates the goal achievement based on internal evidence and external feedback; and is willing to meet new challenges (Oddi, 1987; Skager, 1979).

Industrial/organizational psychologists have contributed to the study of personality traits as they provide quantitative measures that could be used in assessment of learning and prediction of job performance in the work environment (Hogan & Holland, 2003; Hogan & Roberts, 1996). Researchers developed a unified model for normal personality known as the five-factor model that found practical application in the industrial and educational arenas (Barrick & Mount, 1991).

Self-directed learners tend to be intrinsically motivated, and they tend to respond to extrinsic motivation that incorporates free choice among learning options (Stockdale & Brockette, 2011). Researchers such as Oliver and Simoes (2006) have also noted that perceived self-efficacy is evident in learners who are self-directed found, through

confirmatory factor analysis of surveys taken by 384 university students, that factors influencing SDL were self-efficacy, conscientiousness, epistemological beliefs, and beliefs about internal control, while age and gender had no significant impact. Researchers have called for further study of SDL as a personality trait (e.g., Lounsbury et al., 2009; Oddi, 1987; Oliveira & Simões, 2006).

1.3. Self-Directed Learning as a Model and Theory

Knowing that SDL is facilitated on the basis of andragogy⁴ as an important theory in the field of adult education, different models of SDL have emerged. Merriam, Caffarella, and Baumgartner (2010) refer to three principal categories framing these models: linear, interactive, and instructional. In early models like those proposed by Tough (1971) and Knowles (1975), SDL was a linear process containing a series of steps toward a learning goal. Subsequent models proposed by Spear (1988), Brockett and Hiemstra (1991), and Garrison (1997) were more interactive in design and incorporated both the context and the nature of the learning process. A third model focusing explicitly on SDL as part of a formal instructional process is developed by (Grow, 1991).

To put it differently, SDL becomes a teaching policy and the instructor is then a facilitator (Deci & Ryan, 1985). So, the teaching SDL models aim at putting on SDL principles to educational setting while taking into consideration the different levels of learners' self-direction. Grow (1991) suggests the "Staged Self-Directed Learning Model" (SSDLM) as an SDL teaching model, where Grow notes that "Students have varying abilities to respond to teaching that requires them to be self-directing" (p. 126). Henceforth, he

⁴ Unlike pedagogy, andragogy is the teaching of adults where the latter are more responsible of their learning.

proposes four learning phases ranging from dependent to self-directedness and recommends that the “teacher’s purpose is to match the learner’s stage of self-direction and prepare the learner to advance to higher stages” (p. 129). The more advanced the learner is, the higher choice and control s/he masters.

Therefore, SDL theory and models came to the surf in the 1970's as a noticeable model of instruction in adult learning practices. Such a theory leads to an SDL process, which contributes to sustaining improvement (Kolb and Boyatzis, 1970).

Moreover, learners become more productive if they are more directing their own process of learning and having more power in selecting their appropriate activities (Boyatzis, 2000). This means that the learner can create knowledge if s/he is given the chance to expose his/her skills and experiences and not duplicate the already knowledge.

Similarly, Piskurich (1993) considers SDL as a ‘tutoring model’. He claims that SDL is a ‘teaching model’ that goes by many names: ‘individualized instruction’, ‘student-centred learning’, and ‘prescriptive learning.’

Then, the instructors are urged to provide learners with some freedom so that they could regulate the suitable practices for learning and retain the curriculum and learners on the same platform (Robotham, 1995). The latter explains that in whatever SDL experience, instructors must set up a program so that the student can be an efficacious learner. They should provide enough guidance and direction in advance so that students do not get lost. They should also often illuminate clearly the goals often so that students can carry out the shift to learning material on their own. In the course of the SDL process, instructors should deliver periodic assessment and recognize prospective deficiencies along the way (Robotham, 1995).

Further, Garrison (1997) agrees with Piskurich (1993) in the sense that SDL as a ‘tutoring model.’ He highlights that SDL is “an approach where learners are motivated to assume personal responsibility and collaborative control of the cognitive and contextual processes in constructing and confirming meaningful and worthwhile learning outcomes” (1997, p. 19). He recommends that the focus of interest should be the student.

Accordingly, Akerlind & Trevitt (1999) agrees with both Piskurich (2010) and Garrison (1997) in the fact that SDL is said to be a teaching model. Yet, Pintrich and Schunk (1996) sees that model of SDL includes three general categories of strategies: cognitive learning strategies, metacognitive control and resource management strategies.

Correspondingly, the ultimate aim of SDL model is to teach students to become learners who are able to identify and enhance their own learning shortage (Schmidt, 2000). However, not all learners are able to set up objectives and keep up motivation obviously and effortlessly. Therefore, the learning environment and teaching practices must be designed with intention to support students' SDL (Omari, Moubtassime, & Ridouani, 2018).

Eventually, Greveson and Spencer (2005) see SDL as an essential criterion for life-long learning and share the belief of Piskurich *et al.* (2010) that the SDL is a ‘tutoring model’. They argue that learners should take up too much room in their learning processes and be stimulated to be educationally ‘self-managing,’ which will empower the student to remain a life-long learner beyond the classroom boundaries.

According to Macaskil (2013), the self-directed process model is based on the cooperation between students and teachers in such a way that the former gradually improves a certain autonomy for his/her own learning process while the latter supervises and sharpens that autonomy academically. Indeed, SDL necessitates a model swap from ‘teacher-centred

approach' to 'student-centred approach.' Macaskil (ibid) insists that while SDL can be instigated at any level of study, the adult is the ultimate learner for self-directed model of tutoring.

Straightaway, English and Kitsantas (2013) go with the view of Piskurich *et al.* (2010) that SDL could be an instructing model. Hence, the learning setting and teaching policy must then target the learner's SDL. Besides, Macaskill & Denovan (2014) believe that SDL is by itself a "model of instruction" whereby learning framework is pre-determined by the instructors but students learn at their own pace.

In short, institutions are recommended to adopt the SDL approach with the hope that the instructor would be no more than a mere facilitator and the learner becomes a real controller and assessor of the learning process (Boyatzis, 2000).

1.3.1. Garrison's Model of Self-Directed Learning

While Knowles (1975) inaugurated the grounded constituents of the SDL theory. Garrison's model prolonged the theory by focusing on the actual learning process. Garrison (1997) suggested an incorporation of three basic elements to individual learning, which constitutes a model of learning. The three elements are "self-management, self-monitoring, and motivation" (p. 20). The dimensions of the model defined separately interconnect in action. This study examined all dimensions of Garrison's SDL process.

Motivation, the first dimension of Garrison's (1997) SDL model, is important in the initiation and persistence of efforts geared to the attainment of learning and cognitive goals. Garrison admitted a limited understanding of the link between cognition and motivation. Motivation reveals the supposed value and expected success of learning goals at the time

learning is initiated. It mediates the connecting context (control) and cognition (responsibility) during the learning process (Garrison, 1997). “Self-monitoring addresses the cognitive and metacognitive processes: monitoring the repertoire of learning strategies as well as an awareness of and an ability to think about our thinking (plan and modify thinking according to the learning task/goal)” (Garrison, 1997, p. 22). The learner is responsible for personal implementation and clarification, incorporating new ideas and concepts with previous knowledge. Taking responsibility for self-monitoring demonstrates the learner’s dedication to assembling meaning through critical reflection and collaborative confirmation.

According to Abd-El-Fattah (2010), this involves the learner “monitoring the repertoire of learning strategies as well as awareness and an ability to think about our thinking. . . . The learner takes responsibility for the construction of personal meaning through integrating new ideas and concepts with previous knowledge” (p. 587).

Self-management relates to task control issues—the social and behavioural execution of the learning goals, specifically the external actions associated with the process (Garrison, 1997, p. 21). This dimension is concerned with the performance of the learning goals and the administration and monitoring of learning resources and support.

Summary of the SDL Review

This section has presented an overview about SDL as a concept, as a process, and as a model. It has shown thus different definitions and scientific descriptions of the concept of SDL, such definitions were presented in terms of a chronological order starting from Roger (1969), passing by many authorities such as Knowles (1975); Brookfield (1986); Boud (1988); Candy (1991); Robothan (1995); Garrison (1997); Zimmerman (2001); Merriam (2010); and

arriving to Macaskill and Denovan (2014). The section also has attempted to explain SDL as a process and to Garrison's Model of SDL, which is the basis of this study.

2. Overview of Digital Literacy and Web 3.0

Scholars refer to the Internet before 1999 as a "Read-Only" web. The average Internet user's role was limited to reading the information which was presented to him. The best examples of this 1.0 web era are millions of static websites which mushroomed during the dot-com boom (Aghaei, Nematbakhsh, & Farsani, 2012).

Web 3.0 stands for the semantic Web or the Web of data (Lu et al., 2002 and Cho, 2008). While Web 1.0 was to connect content, and Web 2.0 has been developed to connect people socially, Web 3.0 is now to connect collective intelligence (Wheeler, 2012). Thus, Web 3.0 is the transformed version of Web 2.0 with technologies and functionalities such as intelligent collaborative filtering, cloud computing, big data, linked data, openness, and smart mobility. Indeed, thanks to Web 3.0, the user is now immersed in technology and is not only able to read and write, but they can read, write, and execute as well.

Indeed, Web 3.0 is the latest evolution in the Internet communication and will not only rearrange the Web interaction but will also have a significant effect on higher education. Web 3.0 will rise to new teaching methodologies and will also revisit existing methods. Yet, the actual implication of what Web 3.0 applications entail and how it will influence the Web experience is not clear (Knublauch et al., 2014).

(Gómez-Pérez & Benjamins, 2002) focused on initial conceptual frameworks of the challenges arising from the use of Web 3.0 Apps. Related research by Lu et al. (2002) and Rosell (2002) examined potential prospects and limitations that Web 3.0 might reveal and

how an institution could enhance learning outcomes through the use of such Apps. In recent times, the focus has shifted to industry-specific research on the application of Web 3.0 technology.

Generally speaking, Web 3.0 is a so new concept in the domain of Web evolution that its defining will assist in classifying novel and emerging Web technologies into the correct evolutionary genre, starting from Web 1.0, via Web, 2.0 and arriving to Web 3.0. Web 1.0 is a platform through which information could be published in a static form, well designed with text and images. It portrays an environment where information and data are static and displayed with no interaction between the information and the consumer and minimal content creators, also known as the read-only Web (Rudman, 2010).

Most research conducted on Web 3.0 has been done by non-governmental organizations like Booz and Company, Verizon, Gartner, Clearswift and SEM Logic (Bruwer et al., 2015). All of them contain whitepapers and articles with few academic peer-reviewed articles (Garrigos-Simon et al., 2012). The majority of these articles aimed to provide a clear-cut definition of Web 3.0, but only few address advantages and disadvantages arising from the incorporation of Web 3.0 Apps.

The two largest areas of uptake of Web 3.0 include inter alia e-learning (Hussain, 2013; Wade et al., 2013; Isaias et al., 2014), marketing (Garrigos-Simon et al., 2012) and information management (Szeredi et al., 2014).

While the user of Web 1.0 was no mere than a passive consumer of information, s/he turned to be an active interactor thanks to Web 2.0, but s/he transcends such an interaction to contribute in the production of information change through the use of the semantic Web of Web 3.0. Undeniably, Web 3.0 revolutionizes information discovery (Kesavan, 2013).

(Bruwer, 2014) believes that the next generation of the Web, Web 3.0, is not represented by the emergence of a new Web but rather an extension and calibration of the technologies already present in Web 2.0. Internet content is becoming more diverse, and the volume of data are getting much larger, which makes management of information more critical (Bergman, 2001). The Web is becoming a platform for linked data. Data are becoming more openly available to consumers, and by making connection between similar data characteristics, the data itself becomes more valuable (Tarrant, Hitchcock, & Carr, 2011). The need for data structuring and integration is crucial to enable the Web to evolve into its next phase.

(Rudman & Bruwer, 2016) state that Web 3.0 involves a joined Web practice where the device is able to recognize and register data in a way similar to human mind. This enables a world-wide data warehouse where any format of data can be shared and understood by any device over any network. Web 3.0 allows new opportunities and challenges. Opportunities can mainly be characterized as the independent incorporation of data and services which increase the pre-existing capabilities of Web services, as well as the creation of new functionalities. The challenges mainly concern unauthorized access and manipulation of data, autonomous initiation of actions and the development of harmful scripts and languages (ibid). Web 3.0 entails a thorough renewal of the Internet and IT infrastructure. Institutions are recommended to incorporate Web 3.0 in order to cope with such innovations. If not, they may lag behind development and thus lack students' learning needs (Spencer, 2009).

In order to obtain a better understanding of what Web 3.0 consists of and how it functions, one needs to be familiar with specific terminology associated with Web 3.0 technologies. In short, Web 3.0 provide instructors with the opportunity to customize a

Weblog and share information and content with learners and their mates. They can also insert assignments and post links to helpful online learning, and learners are allowed to insert their comments and feedbacks as they can access from any machine that has internet access (Berners, 2009).

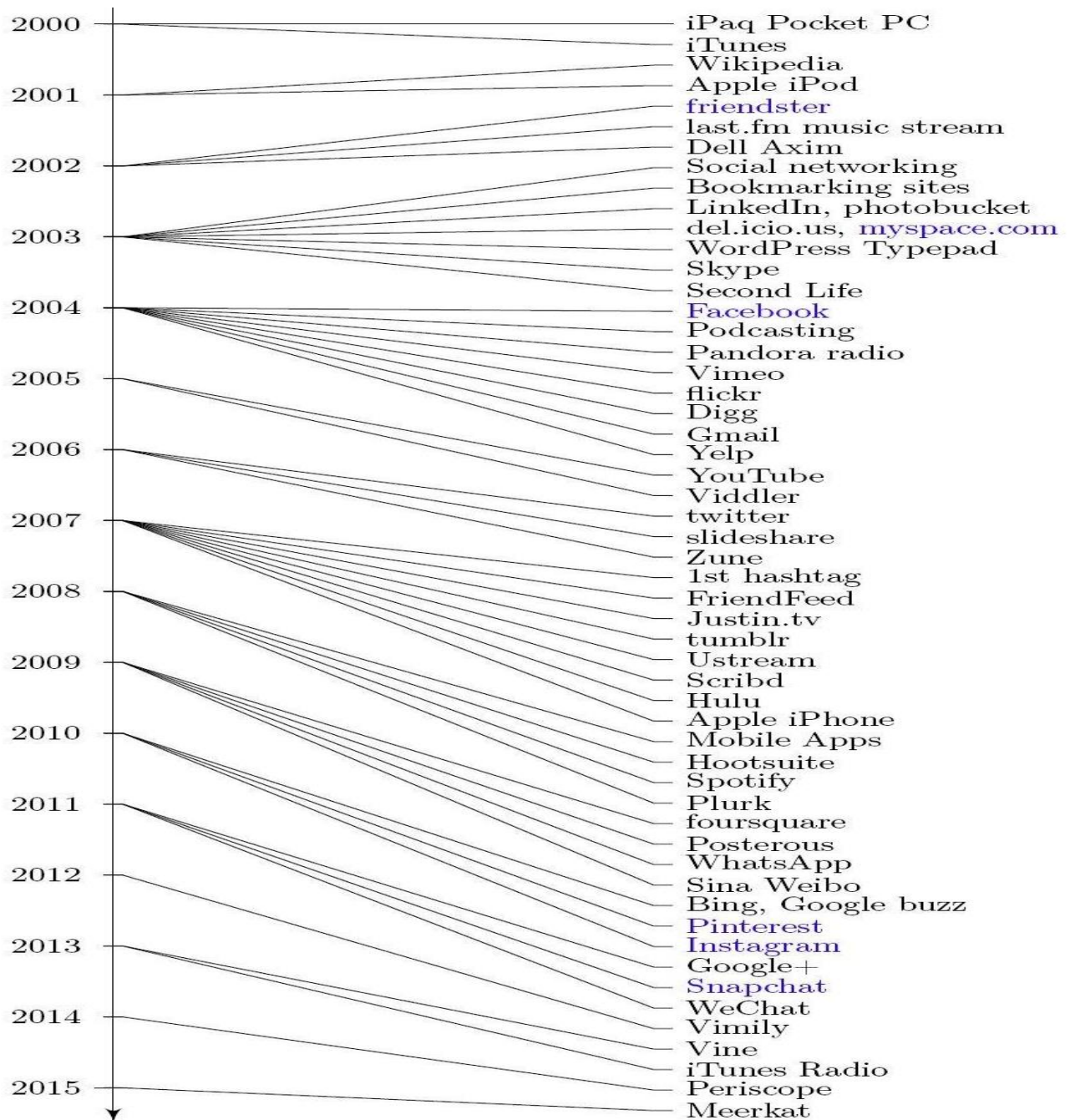
3. An Overview of Web 2.0

This section attempts to reveal that Web 2.0 is traced back to the late 90s and conceptualized from different perspectives, but it can be categorized based on two main authorities. DiNucci and O'Reilly (2004) were the first to coin the concept Web 2.0. The latter is generally understood as a way for individuals to connect, store, communicate, and collaborate in ways that were limited with Web 1.0.

3.1. A Brief History of Web 2.0

Several technological advancements helped usher in the Web 2.0 era. Broadband Internet access, improved Web browsers, and the development of widgets are just some of these technological advancements. Broadband is a type of high-speed data transmission that enables faster Internet access. A Web browser is a software application that locates and displays Web content. Microsoft Internet Explorer and Mozilla Firefox are examples of popular Web browsers. A widget is a computer element that displays information and responds to actions. Examples of widgets include buttons, icons, pull-down menus, and selection boxes. These technological advancements enabled the transition from Web 1.0 to Web 2.0.

Figure 2 A Brief History of Social Media and the Web 2000s (Boyd, 2015)



Mata et al. (2019) confirm that the World Wide Web (WWW) has a great potential for use in the delivery to a variety of people. With its growing population and ever-extending reach, the Internet now represents the greatest communications medium ever created. From learners to homemakers to business executives, individuals from all backgrounds, and all parts

of the world, are connecting to the Internet in exponentially increasing numbers. Combined with a dizzying proliferation of 'Net-enabled' devices, Internet connectivity has become both pervasive and relatively inexpensive.

Indeed, the Internet is a vast, global connection of individually owned and operated computers and computer networks. No single organization can claim ownership of the Internet. Computers connected to the Internet are called '*host*' computers, and each one has the capability to communicate with every other one. There are many ways to connect a computer to the Internet, including temporary dial-up connections and permanent or semi-permanent network connections.

In the home, most individuals connect to the Internet via a temporary dial-up telephone connection. To gain Internet access, subscribers will typically pay a fee to an Internet Services Provider (ISP). Newer technologies, such as ADSL (asymmetric digital subscriber line) or cable connections to the Internet are becoming increasingly popular. Once connected to the Internet, most will use a Web browser to access a subset of the Internet, called the World Wide Web (WWW). The WWW is made possible by an ever-increasing number of Web servers on the Internet, which client computers access using a Web browser before making requests for Web pages.

3.2. Conceptual Framework of Web 2.0

While reviewing the literature, the coining of the term Web 2.0 has been attributed to two main distinguished authorities. First, DiNucci (2004) initially coins the term Web 2.0 to refer to the upgrading of the Internet.

The Web we know now, which loads into a browser window is essentially static screenfuls (sic), is only an embryo of the Web to come. The first

glimmerings of Web 2.0 are beginning to appear, and we are just starting to see how that embryo might develop. The Web will be understood not as screenfuls of texts and graphics but as a transport mechanism, the ether through which interactivity happens. It will appear on your computer screen, on your TV set, your car dashboard, your cell phone, hand-held game machine maybe even your microwave oven. (DiNuccy, 2004, p. 32).

DiNucci (1999) thought that the Internet would have a different shape and would function as a means of incorporating a variety of media setups and devices such as computers, TVs, car, dashboards, cell phones or microwaves. Yet, the main change was at the technical level. Later, O'Reilly (2003) has contributed to the spreading of the concept Web 2.0 and succeeded to make it public at the Media 2.0 Conference. According to him, Web 2.0 should have a new lease of life after the collapse of the dot-com. In more clear terms, Web 2.0 did not come to explain any technical changes in the way Web functioned, but it offered extensive changes in a way the individuals see and use the Web (O'Reilly, 2003; Beer & Burrows, 2007).

Web 2.0. O'Reilly Media first introduced the term Web 2.0 in 2004. The consensus was that Web 2.0 was not a new development of the Web, but rather an extension of the original ideals, principles and underlying infrastructure of Web 1.0 (Anderson, 2007). In an effort to clarify the paradigm shift, (Getting, 2007) describes it as the greater collaboration between consumers, programmers, service providers and organisations, which enabled them to re-use and contribute information,

According to Siemens (2004), the true competence for a lifelong learner would be the capability to “stay connected” and “belong” to digital communities with which interests are and can be continuously shared.

O'Reilly (2005) believes that people are no longer mere receivers of information. They can make use of the innovations of information and communication technology (ICT) to widely create, store, modify and distribute information, to cooperate with others and to contribute worldwide apart from their socioeconomic ranks (Dearstyne, 2007, p. 26).

This implies that the concept of Web 2.0 was first proposed in 1999 by DiNucci and popularized by O'Reilly in 2004 (Graham, 2005) and collectively refers to Web-based tools and technologies with a strong social component. The term reflects the increasing participation of users in the generation, publishing and sharing of content, and the Internet as a two-way channel rather than a repository from which users are able to download files and applications.

Furthermore, O'Reilly (2005) provides a first exhaustive description of the concept Web 2.0, which started to be used as a novel term ahead to the International Web 2.0 Conference. Here, Web 2.0 stands for another phase of the Web that offers users the possibility to be join through collaborating technology. However, the term Web 2.0 does not have an agreed definition. Web 2.0 is also referred to as the "read/write Web" and the "social Web" which comprise the central ideas related with Web 2.0. For example, according to Maness (2006), some academic librarians simply define Web 2.0 as an idea, or a way to think about something in a new way.

Musser & O'Reilly (2006) delve more into the description of Web 2.0 and consider it as a recent phenomenon that has led to a revolution in online communication and customer behaviour. They describe Web 2.0 as "a set of economic, social, and technology trends that collectively form the basis for the next generation of the Internet—a more mature, distinctive medium characterized by user participation, openness, and network effects" (p. 4). They even

recommend that the administrations should adjust their ways of doing business in order to cope with the incessant substitution of the client's demands. Moreover, both authorities proclaim that Web 2.0 applications such as wikis, social networking sites, RSS feeds, and peer-to-peer applications become richer every time more individuals are using them. They explain that such applications contribute to collective intelligence and lifting the individual's self-service go smoother and faster.

Later, Anderson (2007, p. 5) describes Web 2.0 technologies as: "a group of technologies, [...] associated with the terms blogs, wikis, podcasts, RSS feeds etc., which facilitate a more socially connected Web where everyone is able to add to and edit the information space" (p.). Still, Web 2.0 is simply understood as "a bottom up organization of tools and activities that are housed on the Internet" (Orr, 2007, p. 53).

Alongside, Web 2.0 is the change that means that the Web is no longer a platform upon which content is published by a select group of individuals; technically skilled, or knowledgeable in particular areas but instead continuously modified by all users in a participatory and collaborative fashion (Darby et al., 2008).

Another view is that Web 2.0 applications are characterized by their interactivity and collaboration that link with sociocultural theories of learning which tend to stress the co-construction of knowledge in social settings (Selwyn, 2008). This has prompted educationalists to consider how they can capitalize on the popularity of these new technologies and harness them for learning purposes.

Within the same platform, (Shum, 2008) believes that Web 2.0 applications are controlled sites that openly seek to connect people with people, via the artefacts that they share. The greater the numbers of people who participate, the higher the return on effort

invested. Social tools provide a range of ways in which users are made aware of peer activity, for instance, alerting when another user ‘touches’ your material (e.g. by reusing it, making it a favourite, tagging it), or by mining social network structure to suggest contacts in a professional network.

More interestingly, Web 2.0 technologies accentuate an enlarged importance on user-generated content, data and content sharing, collaborative efforts, new ways of interacting with Web-based applications, and the use of the Web as a social podium for generating, relocating and consuming content (Harris & Rea, 2009). As involvement and social interaction radically effect online learning outcomes (Shea & Bidjerano, 2012), the field of education has dynamically hugged Web 2.0 applications as an outcome of learners’ needs to incessantly evaluate their educational strategies in the learning and teaching process. The number of institutions of higher education offering online courses continues to grow; in the fall of 2011, almost one-third of higher education students (6.7 million students) took at least one online course (Allen & Seasam, 2004).

Moreover, Web 2.0 applications offer a democratization of knowledge and information (Han, 2010, p. 201; Kietzmann, Hermkens, McCarthy, & Silvestre, 2011, p. 242). In contrast to the Web 1.0 old-style one-way communication like e-mails, Web 2.0 substitutes the vision and practice of the Internet and explains how now “Web-user integration, participation, and collaboration are motivated in this context, i.e. social practices being integrated within a technological mediated environment” (Lehmkuhl & Jung, 2013a, p. 1).

Likewise, some scholars believe that Web 2.0 has brought a fundamental change at the level of communication (Lehmkuhl & Jung, 2013b). Internet users have effectually shifted from a one-way directional communication towards a multidirectional communication

(Ballantyne & Varey, 2006). Such a shift has displaced communication from being a “to-and-fro transaction focused” towards a “with-and-between relational focused” communication (ibid, p. 226).

In short and throughout the literature, many scholars identify the concept of Web 2.0 as the second stage of the World Wide Web (WWW). The scholars agree on the radical shift from Web 1.0 to Web 2.0 with the sunrise of the twenty-first century. Now, the Web increasingly grows to become a more collaborating entity. Such a growth emanated from the evolution in the popularity of social media Websites, such as Facebook and MySpace, and other interactive platforms, including YouTube and Twitter. Indeed, this stage allows for more user interaction than the first stage of the Web, known as Web 1.0. The following section will elaborate more on the difference between Web 2.0 and Web 1.0.

3.3. Difference between Web 1.0 and Web 2.0

Musser and O’Reilly (2004, p. 41) compare between the time before and after the birth of Web 2.0 as the turning point for the Internet. While “Web 1.0” was about accessible information provided by a Website owner who would publish material and the Website user would read, listen, or watch the content without the ability to react, with Web 2.0 there is the implication that the users of Web sites contribute to them as well as consuming the information.

To illustrate, O’Reilly (2005) explains that Web 2.0 is an apparent growth of the Web 1.0 in a path that is traced by ‘collective intelligence’ that puts together the latest information technology and the user participation, openness, as well as network effects. This implies that while Web 1.0 is about connecting information, Web 2.0 is about connecting people.

While Web 1.0 users just log into the stagnant Website to search for data and use it for their academic or personal project, Web 2.0 users are allowed to collaborate, share content, and interact on the ever-changing Website (Anderson, 2007; Davis, 2009; Gibbons, 2007). In other words, the Web 1.0 Website contains rarely updated data and does not provide individuals with the chance of tracking any change (Golberg, 1998); whereas, Web 2.0 Websites allow individuals to stay active online and add or remove data. Wikipedia is an example of Web 2.0 applications since individuals can insert modifications to the entries.

More interestingly, Web 2.0 applications are characterized by their open sources. This means that all users can access the source code for the application as they have the power to adjust an application or create new applications from it. Inversely, Web 1.0 applications are copyrighted, meaning that only the application's owner can modify and create new applications from it. However, there are negative aspects of Web 2.0 applications. Increased interaction might involve allowing people to post reviews to a business's Website. Different users, for example, may insert contradictory comment. Some users may even put bad reviews, and the reader will feel in a dilemma which comment s/he has to believe (Balazinska, et al., 2007).

In short, if Web 1.0 is about connecting information, Web 2.0 is about connecting people (Kohls & Wedekind, 2011). This implies that Web 1.0 Websites are static, meaning they do not show life, while Web 2.0 is vivid and offers features that Web 1.0 does not.

3.3.1. Edublog

Like Moodle and MOOCs, Edublog is a free social learning platform where instructors can create groups and subgroups to assign content, share schedules, provide quizzes, and lead surveys in just a few steps. Educators can initiate learner discussions and collaborations with

posts. Edublog Snapshots provide instructors with the opportunity to post quizzes from a test bank of over 1,000 questions (Bérard, et al., 2013; Carlson & Raphael, 2015; Taylor & Derudder, 2015). The Snapshots provide quick assessment data to determine student progress, and links to free online resources to reteach missed standards. Teachers can acknowledge achievement with custom badges. Edublog is accessible with a personal computer and Apple, Android, and Windows devices (Crane, 2012).

Edublog is a micro blog that is similar in appearance to Facebook though Holland and Muilenburg (2011) claim students perceive it as a clearly academic platform, which is not the case with Facebook. Edublog lacks the distractions that can occur using Facebook, which is mostly that it is used for non-educational purposes. Edublog allows for bi-directional teacher-learner interaction. The teacher can communicate to the class or to any individual student.

Likewise, a student can communicate to the class or send a private message to the teacher. Learner-learner interaction is limited, as students cannot communicate directly to one another. Learner content can be made very interactional as hypertext links and documents can be dynamically uploaded and downloaded easily by both teachers and students (Kongchan, 2012).

The fact that Edublog is similar to Facebook, the most popular social networking site, helps students and teachers adapt to this new educational platform. Moodle and Blackboard, on the other hand, have unique features that need to be learned by both teachers and students (Kim et al., 2012; Fageeh & Mekheimer, 2013; Al-Kathiri, 2015).

In short, learners' active engagement in self-initiated, self-constructed, and self-monitored learning experiences has long been held to be essential to human development, including language learning (Benson & Reinders, 2011; Kormos & Csizer, 2014). Thus,

Edublog, as Web 2.0 tool, can provide interesting spaces and venues in the field of EFL learning and promotes SDL, yet it is necessary that EFL learners possess the basic competencies to engage in SDL successfully (Benson & Reinders, 2011; Lai, 2011; Reinders & Darasawang, 2012).

A toolbox is an example of Edublogs, and it is an umbrella term that stands for an electronic window. The latter permits individual users to store their knowledge and share it with other users. Blogs, e-portfolios, wikis, and social bookmarking are examples of a toolbox.

2.4.1.1 Blogs

The term “Weblog” is a short form that stands for “Web logs.” Individuals can create blogs with the purpose of posting personal activity. The latter may take the form of texts, messages, videos, images, and audio. Thanks to its interactive characteristic, other bloggers may insert their feedback and add their comments. (Kock, 2008)

Weblogs started out humbly enough in the second half of the 1990s and helped ignite the popularity of the Read/Write Web (Hendron, 2008). Historically, the eight-year period between 1996 (when the first Weblogs began to emerge) and 2004 (when podcasting emerged) are the transitional years between Web 1.0 and Web 2.0.

Shank and Bell (2007) refers to Weblog (blog) as a tremendous tool for learner’s reflections and sharing. Blogs can thus be used as collaborative tools for sharing information, links and content. Some blogs allow others to post questions and comments too. Hence, the blogger becomes able to store records of ideas, perceptions, visions, and references and so on for the blog user and those who see it. Moreover, bloggers can save paths of their learning experiences, new findings, modifying views, and updating references. Therefore, the learner

can take the initiative to add new data, improve awareness, and retain a record of learning growth.

Armstrong and Franklin (2008) refer to the term blog as a contraction of “Web log”, which suggests that blogs were originally considered as online log books where the adherent could insert his/her log entries, and if s/he wishes publishing them. Blogs, like log books, are snowballing and each new entry is linked to the previous ones (usually with the newest ones at the top). They also offer a variety of features not found in logbooks. Entries can be “tagged” with appropriate key words (or phrases) so that related items can easily be brought together. With many blog systems, the journal of individual entries can be oriented to private, to friends / colleagues only or to the public.

Most blogs also allow the reader to post comments, and these may require moderation before they become public (the decision is left to the owner of the blog). Blogs can be published using “RSS” which allows readers to easily see when new postings have been made, so that they do not have to go to each blog that they are interested in but can see them all in a single newsreader or aggregator (Alvarez, 2012).

Nowadays, learners are able to invent, store, and rectify their projects relying on e-portfolio. Shank and Bell (2007) explains that e-portfolios are highly contributing to displaying the learner’s academic achievement online. He believes that an e-portfolio presents an area where learners can put down signs of “meeting instructional goals” (p. 34).

In brief, a Weblog is considered as one of the components of Web 2.0 technologies that present chained entries permitting users to asynchronously store data –be it a text, a video, an audio, or graphics- add new information and modify it (Deng & Yuen, 2011).

More interestingly, “the more you update your blog, the higher your blog will appear in search rankings, since sites such as Google like blogs that are regularly updated and that have links” (Koeppel, 2017, pp. 26-69).

Blogs today are set apart from other types of Web sites through several attributes. First, many blogs enable readers to add comments to individual posts. Second, blogs have a list of links to other blogs and sites of interest, called a “blogroll.” Third, blogs contain links to individual posts, called “permalinks.” Last, some blogs include the ability to link to other blog posts by different authors, called a “trackback.” (Hendron, 2008).

Blogs are easily and frequently updated Web pages that anyone, regardless of technical prowess, can maintain. Authoring a blog can be a solo or group pursuit, and it can be done inexpensively. The best blogs are frequently updated, satisfying a reader’s desire for something new.

2.4.1.2 *E-portfolio*

E-portfolio provides the learner with a margin of autonomy in the sense that s/he does not only create and share projects with peers, teachers, and future recruiters, but show her/his proficiency outside of the classroom as well. Here, the learner becomes more responsible for reflecting on their learning and achieving instructive aims. Shank and Bell (2007) finds out that several instructors push the learner to generate his/her academic e-portfolio since there are institutions that have begun requiring the submission of e-portfolios as a partial fulfilment of the requirement of graduation degree. For example, the learner may work on Personal Learning Plan (PLP) e-portfolio application either individually or as a member of a team. The teacher provides his/her students with the URL of the PLP and the password so they can post

their tasks and project attainment. Classmates and the teacher have the right to scroll down and add comments.

2.4.1.3 Social Bookmarking

Social bookmarking sites (such as del.icio.us, diigo.com and StumbleUpon) allow people to collect all the Webpages that they are interested in into a set of bookmarks (similar to Internet Explorer Favorites or Firefox Bookmarks, but held on a server instead of the user's computer). Usually, they allow entries to be tagged so that they can be grouped together by subject. Thus, “teachers and students can build subject specific resource lists that they can easily share when using RSS” (Richardson, 2009, p. 9). Many social bookmarking sites will suggest appropriate tags based on the tags that other people have used when bookmarking the same site.

As well, social bookmarking sites can be fruitful in such a way that users can see who else has bookmarked the same site, who is interested in the same topics, and what else they have bookmarked. Social bookmarking can thus be used to locate other resources and people interested in the same topic.

Shank and Bell (2007) believes that social bookmarking sites provide the instructors and learners with the opportunity to share their bookmarks easily. He insists that putting bookmarks online enables sharing and using them synchronously and asynchronously because they are accessible on the Web from anywhere and anytime provided the user is online. Besides, social bookmarks contribute to making research and collaboration easy.

Furthermore, some scholars confirm that social bookmarking sites provides users with the possibility not only to keep records of their remarkable sources and information, but also

to create personal searchable library thanks to the huge number of Webpages they can generate (Richardson, 2009).

3.4. Web 3.0 Applications

Web 2.0, the second generation of the Web, refers to a collection of Web-based technologies, including blogs, wikis, audio-podcasting, video-podcasting, RSS feeds, social bookmarking and tagging, social networking, multimedia sharing, and so on (Anderson, 2007). The concept of the Web 3.0 and its accompanying applications and services are continuously being updated and changing how people communicate with each other. Generally, the main accompanying applications can be gathered under five main umbrella terms: toolbox, social media, media sharing, google apps, and blended learning technologies (Hardy, 2012).

3.4.1. Edmodo

Edmodo (www.Edmodo.com) is a free SNS offering a virtual environment where students and teachers can connect to network for curricular pursuits. Started in 2008 by two Chicago public school teachers, the primary goal of Edmodo was to provide a social network environment for teachers and students because popular social media sites such as Facebook and Twitter were blocked by their school district. By August of 2011, Edmodo counted 3 million users world-wide. The introductory materials to Edmodo state, “It's not a question of should we use social media in the classroom, but a question of how” (Giacomantonio and Pierro, 2012). Edmodo is the designers’ answer to this question. Edmodo's objective is to provide free social learning to as many schools, teachers, and students as possible. In addition, Edmodo wants to make it safe and easy for students and teachers to connect with each other (ibid).

3.4.2. Kahoot

Kahoot! is a game-based learning platform, used as an educational Web 3.0 application in schools and universities. It encompasses multiple-choice quizzes and jumbles that allow user generation and can be accessed via a Web browser. Kahoot! can be used to review learners' knowledge and track their responses and scores for formative assessment. Kahoot! also includes trivia questions, and it is intended for interactive learning, with participants brought together around a shared screen such as an interactive whiteboard, projector, a computer monitor, or a smart TV (Thorne, 2009). Kahoot! can also be used through screen-sharing tools such as Facebook, Skype, WhatsApp, or Google Hangouts. The game design is such that the players are required to frequently look up from their devices. The gameplay is simple; all players connect using a generated game PIN shown on the common screen, and use a device to answer questions created by a teacher, business leader, or other person. These questions can be changed to award points. Points then show up on the leader board after each question.

Besides, the integration of Kahoot as a Web 3.0 game-based learning activity can contribute to enhancing students' vocabulary (Anyanwu, 2014). The experiential classroom milieu advantage is confirmed as a higher presence and engagement, and more concentrated and participatory students in class. The instructor can retain regular feedback and assess the understanding of the students in a motivated way. Moreover, Kahoot guarantees a free access, and participants can use their own mobile devices to take part in the game. These positive points encourage teachers of English, who wish to emphasize vocabulary, to include this kind of online games into the course of English for specific objectives. Indeed, these new technologies lead to develop new pedagogies (Brown, 2016).

Kahoot can be played through different Web browsers and mobile devices through its Web interface. In September 2017, Kahoot! launched a mobile application for homework. In March 2017, Kahoot reached one billion cumulative participating players and in the month of May, the company was reported to have 50 million monthly active unique users (Dellos, 2017).

3.4.3. Media Sharing

Media sharing allows people to post their photos, videos, podcasts (audio files) and vodcasts (videos). There are wide varieties of sites including *flickr* for photos, *YouTube* for videos, *iTunes* for podcasts, *Slideshare* for presentations, *scribd* for documents etc. such media sharing sites provide users with the ability to post their contributions, and to tag them on another occasion with key words. In most cases media sharing allows viewers to post comments, reviews or ratings as well.

It is worth noting that in most cases the user is assigning many of their property rights to the site owner. Some require content to publish under some form of Creative Commons license, while others seek non-exclusive rights over the content. However, after grass roots campaigning site owners seem to be seeking fewer rights than two or three years ago.

3.4.4. Webinar

The term “Webinar” combines “web” with “seminar,” and is sometimes referred to as “enterprise conferencing.” Participants access the Webinar via the Internet, and there is usually a way to ask questions and for the presenter to respond. They can be live or recorded.

A Webinar is referred to as a mobile online meeting at distance for direct / synchronous discussions face-to-face, with a predefined aim, during real-time and a specific time period, guidance of a teacher. The potential of online synchronous Webinars is that everyone can see

and hear each other and at the same time communicate via textual chat. Furthermore, the synchronous online Webinars can be recorded for later asynchronous viewing online in the learning management system (LMS) in order to provide students with the opportunity to take a step back, reflect, self-assess and compare various contributions. Several activities can be part of the course structure with online synchronous Webinars in order to mediate meaning and learning on a higher level (Amhag, 2015).

Some Webinars are split-screen, with a video feed of the presenter on one side and the slides showing on the other. Some Webinars are open to anyone who has keyed in the right online code; some are closed (Friesen, 2016).

3.4.5. WebQuest

A WebQuest is “a computer-based teaching and learning model in which learners are actively involved in an activity or situation and use the Internet as a resource” (Halat, 2008, p. 109). These online teaching tools are “...inquiry oriented [and] optionally supplemented with video conferencing” (Dodge et al., 1995, p. 10). First developed in 1995 at San Diego State University by Dodge and March (Dodge, 2001), these instructional tools use classroom technology in ways that challenge students to become critical thinkers and active learners using higher order thinking skills to navigate their own educations (Halat, 2008; Ertmer & Ottenbreit-Leftwich, 2013). WebQuests may expose students to knowledge and information they might not otherwise experience by facilitating effective learning with access to digitized primary sources such as photographs, documents, art, and music, as well as structured evaluation of these resources with teacher supervision (Milson & Downey, 2001). For instance, in a unit designed to introduce students to the culture of the Navajo in Rough Rock, Arizona, the teacher may create a WebQuest to engage students in a scenario asking them to

create a visual history of the tribe. Students might be asked to seek out photographs of original Navajo art or listen to interviews that are posted on the Internet. Additionally, by providing structured creation protocol and guidance for both teachers and students (Dodge, 2001), WebQuests have earned a large following in the K-12 educational community, with tens of thousands of teachers embracing the tool (Dodge, 1997; Lamb & Teclehaimanot, 2005). Learners working on WebQuests may engage in a variety of learning activities. Dodge's taxonomy of WebQuests enumerates 12 types: (a) retelling, (b) compilation, (c) mystery, (d) journalistic, (e) design, (f) creative product, (g) consensus building, (h) persuasion, (i) self-knowledge, (j) judgment, (k) analytical, and (l) scientific (Dodge, 1997; Ertmer & Ottenbreit-Leftwich, 2013). Dodge (1995) also identified two types of WebQuests: short term and long term. Educators design short-term WebQuests with the goal of facilitating students' acquisition and integration of knowledge. Typically, short-term WebQuests may take between one and three class periods to complete, at the end of which students should ideally have gained new information and made sense of it (Dodge, 2005; Gaskill, McNulty, & Brooks, 2006). Long-term WebQuests, according to Dodge (1995), should culminate in a learner having analysed, refined, extended, and transformed knowledge. Learners completing a long-term WebQuest should demonstrate their understandings of the material by creating a product others could use. These longer projects may take between one week and one month to complete. An example of a long-term WebQuest, used by Milson and Downey (2001) in a sixth-grade social studies class, spanned a two-week period and included students gathering information about Ancient Egypt to be included in a Time Traveler's Guidebook. Students visited six workstations during the two-weeks, including the Land and Time; Daily Life;

People and Culture; Arts, Science and Technology; and Mummies and Pyramids (Milson & Downey, 2001 and Hollander, 2002).

Students had access to both Internet based information and resource books and created a final product of an informational booklet that included content about political and physical features in Ancient Egypt. Although no research is available to indicate if short-term or long-term WebQuests are more effective, it may be assumed that short-term WebQuests are more useful in the classroom. As Halat (2008) indicated, students may lose focus and wander to sites not recommended in the resource list of the WebQuest and using a shorter, more focused WebQuest may help students stay within the recommended parameters for the project. This study offered its participants the access to a short-term WebQuest that was not part of the school's existing curriculum.

3.5. Web 3.0 Pedagogies

The main objective of this section is to outline the theoretical underpinning of Web 3.0 applications and to argue that Web 3.0 design must consider three fundamental perspectives, each of which leads to a particular view of what matters in pedagogy. Generally, scholars agree on three main pedagogies that best suit Web 3.0 environments.

2.6.1 Connectivist Pedagogy

Connectivist pedagogy stands for the idea that learning occurs when autonomy, diversity, openness and interactivity occur. The learners are able to revisit and repurpose concepts towards the creation of new knowledge, while moving forward within the context of the course (Anderson and Dron, 2011). Autonomy provides the learner with much control over his /her learning outcomes, content selection and thus s/he becomes able to decide what is relevant, and interesting for his/her own learning needs (Larouz, 1996). Diversity refers to

the variety of resources (people and content) and opinions that the learner will be exposed to in a decentralized course and information is presented in a variety of formats and fashions. Openness relates with the simplicity of use and access to information through diverse technology tools. Interactivity explains the connectivity with information and other learners. This happens continuously and it is an incessant continuum creating community within the group.

This pedagogical approach is said to be adequate for planning an open online setting where learners can establish a new content and create meaningful ways of learning, but on the other side, it poses a challenging situation for instructors to manage and coordinate due to the size of the groups and the interactions between learners, instructor and content. It is also challenging from a design standpoint, creating assignments that allow this type of freedom and ownership, poses some challenges as well (Rodriguez, 2013).

Such a pedagogy refers to learning groups as knobs that link individuals and content creating a two-way communication. This leads to the idea that knowledge does not exist in one dominant location; rather, it is a lively division that learners form and reshape.

2.6.2 Social–Constructivist Pedagogy

Social–constructivist pedagogy originates from the study of Dewey (1916) and Vygotsky (1978). Hence, the learner constructs his/her understanding while interacting with the instructor and other learners in the group (Anderson and Dron, 2011). Thus, the learner obtains new knowledge and construct upon his/her previous one to create new experiences, and knowledge is gained not individually but within a social environment.

4. Theoretical framework

The theoretical framework of the present study is grounded mainly on four related key theoretical perspectives. Piaget's Constructivism, Vygotsky's Social Constructivism, Zimmerman's Social Theory of Learning, and Siemens's Connectivism theory for the digital age.

4.1. Constructivism

Generally, constructivism is traced back to philosophy (Bruner, 1966) and it is based on three pillars. Learner's prior experience, learning structure, and learner's active involvement, which contribute to the learner's readiness, learner's spiral organization, and learner's critical thinking respectively (Culatta, 2013). Throughout the literature, different concepts and functions of constructivism have come to the surf.

Several authorities claim that learning stems from the construction of understanding from the past knowledge, attitudes and interests (Fosnot & Perry, 1996; Howe & Berv, 2000; Phillips, 2002; Richardson, (2003). Thus, the learner can establish new knowledge on the basis of the prior knowledge (Watson, 2001). Also, a constructivist learning setting must provide the learner with the chance to display their knowledge experiences (Howe & Berv, 2000; Johnson & Aragon, 2003; Richardson, 2003). To illustrate, constructivism is a culmination of contributions consisting of a variety of theories about learning (Zimmerman, 2013). Two major positions are those influenced by the work of Piaget and Vygotsky. Piaget's work is often referred to as cognitive constructivism and focus on the individual's internal construction of knowledge. In this view social interaction is important as a catalyst or stimulus to the individual who then constructs knowledge. The contingency associated with Vygotsky's view is referred to as social constructivism and emphasizes that knowledge exists

in a social context and is shared with others rather than being constructed merely by the individual (Driscoll, 2000).

Even earlier, (Burner, 1966) points out that constructivism stems from philosophy that adult learning becomes ready, well organized, and expansive thanks to the constructivist theory of learning. Such theory is derived from three basic components. First, the learner is ready to construct from prior experiences and contexts. Second, the learner will easily understand and use any knowledge that s/he already constructed in advance. Third, the instructor has to facilitate the learning experience and collaboration of the learner (Culatta, 2013).

To encapsulate constructivist-learning theory for language instructors, Richards and Rodgers (2001: 109), explain that constructivism refers to the concept that knowledge is socially constructed, rather than received or discovered. Hence, constructivist learners ‘create meaning’, ‘learn by doing,’ and work collaboratively ‘in mixed groups on common projects’. Instead of conveying knowledge to learners, instructors cooperate with learners to generate knowledge and understanding in their shared social context. Rather than looking for satisfying the curriculum, learning focuses on the learners’ experiences, needs, interests, and aspirations.

Lately, constructivism is seen as one of the greatest theories of learning in education and has thus been defined in various ways (Null, 2004). Hence, two different strands of constructivism have come to the surf. Cognitive constructivism, as outlined in the work of Piaget, and social constructivism, as outlined in the work of Vygotsky (Walker, Greene, & Mansell, 2006).

Still, both views see learning as an active, intentional, and constructive practice. Learners in constructivist environments are actively engaged in the learning and responsible

for creating knowledge. Piaget is considered as the father of constructivism, and as Proulx (2006) claims, “Even if many other authors have contributed to numerous aspects of the theory in a tacit or indirect way (e.g., Dewey, Kant, Rousseau, Vico, etc.) the main pioneer of constructivism is without question Jean Piaget” (p. 2).

From another perspective, Merriam et al. (2007) advances that “all forms of constructivism understand learning to be an active rather than passive endeavor. Consequently, learning occurs through dialogue, collaborative learning, and cooperative learning” (p. 292). Gergen (1995) and Robinson & Schaible (1995) critically add that adult learning is constructed actively through engaging, incorporating, and critically exploring the views of others as these open possibilities of interpretation through interaction.

Further, Rice (2007a) explains that social constructivism is based upon four concepts. First, the learner obtains new knowledge as s/he interacts with her/his milieu, course activities and other learners. Second, the learner acquires more when s/he constructs learning experience for others. Rice (2007b) recommends here the “learning pyramid” which states that the learner remembers 10% of what s/he reads, 20% of what s/he hears, 30% of what is demonstrated to her/him, fifty percent of what s/he discusses and seventy-five percent of what s/he practices. The same pyramid states that the learner maintains 90% of what s/he teaches others. Third, when the learner becomes part of culture, s/he is continuously learning. For instance, “you and your partner would probably learn more about ballroom dancing when you are in a dance class, versus watching a video together” (p.19). The interaction with other learners and perchance a diversity of instructors would deepen and quicken the learning process. Fourth, some learners attempt to remain objective and accurate, some attempt to take more subjective views, while others attempt to incorporate both approaches.

Pegrum (2009: 25) sums up the situation by saying that although Web 2.0 platforms open up spaces for constructivist, collaborative pedagogies, 'if educators work against its grain, Web 2.0 can be used narrowly as an electronic add-on to automate information transmission and skills practice.' Moreover, Pegrum (2009: 27) describes constructivism in the following way:

Constructivism puts learners, rather than a given body of knowledge, at the center of the learning process, and aims to build on the pre-existing knowledge and perspectives they bring into the classroom. As students actively engage in educational experiences based on authentic tasks, with guidance provided by teachers or more experienced peers, they collaboratively build new understandings. Facilitated by competent teachers, this can be an empowering strategy that encourages the sharing of ideas, giving everyone a voice without unnecessarily imposing particular points of view.

In short, noticeable scholars praise the role of social interaction in the learning process. Constructivism is a vast departure from traditional didactic pedagogy where the teacher is seen as the purveyor of knowledge. In constructivism, community and environment are relevant aspects of the five-learning experience. Social software has the ability to support three elements that might support constructivist pedagogy: conversational interaction, social presence, and virtual learning communities.

4.2. Social constructivism

According to Dewey (1986), social constructivists consider the learning process as an individual lifelong experience, and the latter comes up thanks to the continuous connection between two or more individuals. Thus, the learner creates their personal vision of the universe through interacting with others. Indeed, Vygotsky believes that the more a learner interacts with others, the more his/her academic and social skills are improved (Andrews, 2012). This

implies that where knowledge is constructed while individuals are connected with each other. As to Andrews (ibid), social constructionists accept that there is an objective reality and that everyday interactions and the language employed by people help them fashion their understanding of the world in which they live.

Fundamental to social constructivists is the notion of scaffolding that is a process of guiding the learner from what is presently known to what is to be known. Social constructivism and teaching incorporate other components such as the use of multiple perspectives, real-world environments, and authentic learning which are all essential to deep and meaningful learning (Vygotsky, 1978). In the context of this narrative inquiry, Vygotsky's principles are particularly relevant as the professional development must be experienced as authentic and meaningful given that change occurs most effectively when it is the by-product of human interaction and exchange (Andrews, 2012).

Later, Sutinen (2008a) situated social constructivism as a theory of learning within the larger framework of educational theorists ranging from Dewey to Piaget and Vygotsky. Sutinen (2008b) maintains that social constructivism is based on the assumption that the individual's construction processes cannot be influenced from the outside. Furthermore, constructivist theories of learning often rely on a notion of development in which it is assumed that the individual's learning process will develop following an intuitive and native capacity which takes into consideration an individual's place in the world and that individual's interaction with everyone and everything.

More interestingly, (Chan, 2010) suggests an instructional design for an online course which incorporates social constructivism, whose aim is to move the learning task from a mere instructional communication to a more practice-based learning model. Here, the learner is

invited to take initiatives and solve problems and thus be more involved in the course of learning. In addition, Chan (ibid) reiterated the notion that in the constructivist model of learning, the experience must be relevant and that the information that is delivered must be situated within a greater context. With these concepts in mind, online courses must be designed such they integrate these features. It is not enough to post documents online which learners are expected to read and then have them either answer questions about the information.

Furthermore, (Gazi, 2009) supports this notion of constructivist design for online courses and argued that this approach encourages learners to manage their own learning through a meta-cognitive, self-reflective, and collaborative process. Gazi (ibid) added that by employing a constructivist design in online courses learners develop a more positive attitude toward learning itself as well as the discipline they are studying.

To sum up, social constructivism highlights the move from an instructor-center to a learner-center, so the instructor is no longer the mere conveyer of knowledge. Rather, they become facilitator of the learning process (Freire, 1970; Illich, 1970). Then, as King (1993) puts it, the instructor has moved from “sage on the stage to guide on the side.” This means that institutions are recommended to provide different learners with different circumstances and settings of learning (Attwell, 2007). So as to fulfil such a recommendation, Web-based education is suggested to satisfy every individual’s needs (Fraser et al., 2007).

4.3. Connectivism

Connectivism has been offered, but has not yet been universally accepted, as a new learning theory for a digital age (Verhagen, 2006; Kop & Hill, 2008; Bell & Gibson, 2011). Connectivism is based on the principle that all learning starts with a connection (Siemens,

2004). These connections occur on neural, conceptual, and social levels (Siemens, 2008), and in connectivism, learning is thought to be “the ability to construct and traverse connections” (Downes, 2007).

The easy accessibility to the Internet and Web 3.0 technologies generate a new theoretical framework of teaching that advanced the prior learning theories of behaviorism, constructivism, and social constructivism (Downes, 2005). The latter refers to connectivism as knowledge of the connection or the understanding of the connection. Further, Siemens (2005) claims that in a Web community, every individual is a member of the Web. This Web community allows each user to have a say in the shared knowledge.

Connectivism as a Learning Theory for the Digital Age acknowledges the swift metamorphosis of information and confirms that the acquisition of new information enables learning to be defined as ‘actionable knowledge’ (Pasley et al., 2008), and participants are connected via a network and each participant is a node who supports the interdependence of the community by providing information, experiences, and knowledge. Siemens (2006) puts down eight guidelines of connectivism:

- G1. Learning and knowledge rests in diversity of opinions
- G2. Learning is a process of connecting specialized nodes or information sources
- G3. Learning may reside in non-human appliances
- G4. Capacity to know more is more critical than what is currently known
- G5. Nurturing and maintaining connections is needed to facilitate continual learning
- G6. Ability to see connections between fields, ideas, and concepts is a core skill
- G7. Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities
- G8. Decision making itself is a learning process.

Such guidelines propose novel functions for university teachers in the sense that they could boost creativity in their students to sustain relevant connections in their online environment. Web 3.0 can play a crucial role in this kind of learning process in making choice of what and how to learn. This new learning theory is crucial in professional development.

5. Previous Case Studies

So far there has been no common ground between studies conducted on the ILOs, SDL, and Web 3.0. However, few studies were conducted about the relationship between Web 3.0 and learning, yet (at least to my knowledge) no single study was exclusively focusing on the impact of Web 3.0 in learning English as a foreign language. Most of the studies done were about nursing, engineering, and education in general.

Within this framework, for example, a study was conducted in Turkey in 2010. The study was on the educational use of Facebook as a Web 3.0 tool. The objective of the study is to investigate the educational use of Facebook. The Computer Networks and Communication lesson was opted for as a sample and the attitudes of the students involved in the project group towards Facebook were measured using a semi-experimental method. Students on Facebook platform were examined for about three months and they continued their education interactively in such a virtual environment. After the-three-month-education period, observations for the students were reported and three different measurement tools measured the attitudes of the students towards Facebook. As a result, the attitudes of learners towards the educational use of Facebook and their views have been reported heterogeneous. When the average values of the group were examined, it was reported that the attitudes towards educational use of Facebook was above a moderate level (Alexander, 2012). Therefore, it might be suggested that Web 3.0 application provides continuity in lifelong learning. To put

it differently, this longitudinal study scrutinized higher education learners' attitudes about Facebook, a Web 3.0 application. Within three months, three different measurement instruments were opted for to measure the perceptions of the learners. Those perceptions were reported to be heterogeneous. In correlational examination, it is proven that learners who spend much time Facebooking have positive attitudes and accept Facebook as an educational tool. This implies that learners who have beforehand seen Facebook as a social setting have positive attitudes towards the important role of Facebook in education. It is displayed that most of learners actively participate in the virtual setting during the study. In this respect, Facebook might be suggested as an effective learning environment. Facebook not only provides several electronic materials but also makes the lesson pleasant. Thus, Facebook Web 3.0 can be used as an educational instrument (Boulaid, 2015).

The main target of a study carried out in Italy in 2010 by Cadorin, is to assess the validity and reliability of the Self-Rating Scale of Self-Directed Learning (SRSSDL) in an Italian sample of nurses. The 'forward-backward' translation process of the original SRSSDL was adopted for the study. 41 nurses were involved in the 'test-retest' reliability. Internal consistency was evaluated in a convenience sample of 334 nurses working in Northeast Italy. The Italian version of the SRSSDL has demonstrated good reliability (Pearson coefficient 0.73) and internal consistency (Cronbach's alpha coefficient 0.94). The SRSSDL was found to be a valid and reliable instrument in the Italian context. This study has implemented the external validity of the scale by its application to a different population and context in its first validation process (Cadorin et al., 2011).

Within the same year and in the same country, a different study was conducted with the aim of examining the concurrent validity of self-rating scale of self-directed learning and

self-directed learning instrument among Italian nursing students. The aim of this study was to measure the concurrent validity between the Self-Rating Scale of Self-Directed Learning (SRSSDL_Ita) – Italian version and the Self-Directed Learning Instruments (SDLI) in undergraduate nursing students. A concurrent validity study design was conducted in a Bachelor level nursing degree program located in Italy. All nursing students attending the first, second or third year ($n = 428$) were the target sample. The SRSSDL_Ita, and the SDLI were used. As a result, the majority of participants were students attending their first year (47.9 %) and were predominately female (78.5 %). Their average age was 22.5 ± 4.1 . The SDL abilities scores, as measured with the SRSSDL_Ita (min 40, max 200), were, on average, 160.79 (95 % CI 159.10–162.57; median 160); while with the SDLI (min 20, max 100), they were on average 82.57 (95 % CI 81.79–83.38; median 83). The findings confirm the concurrent validity of the SRSSDL_Ita with the SDLI. The SRSSDL_Ita instrument can be useful in the process of identifying Self-Directed Learning abilities, which are essential for students to achieve the expected learning goals and become lifelong learners.

Another study was conducted by (Turkman, 2012) whose purpose was to investigate the usefulness of social networking sites as a meaningful learning environment that could support, enhance and/or strengthen EFL learning indicate that if applied properly with certain aims, a social networking site that reminds students of their daily life can provide learners with a frame to assist them in structuring and coordinating acts of knowledge construction. He concludes that combining the Internet social networking options with the curriculum helps the students learning a second language in various ways, including increasing participation and motivation.

In addition, an exploration was conducted at Gazi University in Turkey in 2012. The main objective of the study was to examine the effects of self-directed learning strategy on individual study processes in general music education among Gazi University, Division of Primary School Teaching, 2nd year students. The research was conducted in 2011-12 academic year, fall semester. Ten students for experiment group, and 10 for control group; a total of 20 students participated in the research. The research continued for 4 weeks. Data of the research were obtained via video observations in which students' instrument (block flute) studies were recorded during their individual study time, and via interviews with students. In the present research, significant differences were found between experiment and control group students in terms of the pre-test and post-test scores obtained from video observations and interviews in favour of experiment group students. The findings revealed that students who completed their individual study processes with self-regulated learning method were more successful.

A study of 103 professors who had taught a MOOC at that time was published in the Chronicle of Higher Education (Kolowich, 2013). In this study, the mean number of students enrolled in a MOOC was 33,000 with a 7.5% completion rate. This study went further to discuss the attitudes of the professors teaching these courses. Typically, an instructor spent 100 hours in preparation for the course and spent 8 hours a week during the course. Most do not require students to purchase materials, including textbooks. They found that 55% of the professors noted that time was taken away from their academic responsibilities to run the course and many did this on top of their usual course loads. Before running the class, a third of them were sceptical about MOOCs, but afterwards 90% were enthusiastic. 79% believe that MOOCs are worth the hype, but 77% do not believe that students should get credit for the course from their university.

Iwamoto et al. (2017) run a research to discover faculty satisfaction with online learning in higher education through a study of the initial inclusion of mobile devices in a Web education project in seventeen universities of technology learning. The findings are presented as a SWOT (strengths, weaknesses, opportunities, and threats) analysis. Iwamoto et al. (2017) reported strengths from the Case Study Interviews indicating “informal learning increased as teachers engaged in ways to implement iPads by searching and finding applications, seeking advice from other teachers, and exploring what they could do with the iPad” (p. 51). Weaknesses reported were a “need to overcome student perceptions of school, students who are used to being told what to do, some faculty members not being technologically inclined, and faculty and students needing storage and training in sending and receiving files” (p. 52). Opportunities reported were “providing support for teachers, providing a safe environment to exchange ideas, a place to develop professional learning networks, time for more collaboration, options for alternative assessments such as rubrics, identifying apps they could use and start developing their own” (p. 52). The only threat reported was the “misalignment between assessments and teaching” (p. 52).

Furthermore, an investigation was held at Auburn University in USA in 2013. The aim of the investigation is to scrutinize the relationship among learners’ characteristics, self-directed learning, technology self-efficacy, and course outcomes in online learning settings. Two hundred and fifty-six students participated in this study. All participants completed an online survey that included demographic information, the modified motivation strategies learning questionnaire, the online technology self-efficacy scale, the course satisfaction questionnaire, and the final grades. Based on the results from the final model, students with previous online learning experiences tended to have more effective learning strategies when

taking online courses, and hence, had higher levels of motivation in their online courses. In addition, when students had higher levels of motivation in their online courses, their levels of technology self-efficacy and course satisfaction increased. Finally, students with higher level of technology self-efficacy and course satisfaction also earned better final grades.

Another study confirms that teachers resist the integration of new technologies in the sense that there are too many difficulties to overcome to incorporate online applications into the classroom activities successfully (Ifenthaler & Schweinbenz, 2013). Based on the findings, instructors are recommended to design courses in a way that can promote students' self-regulated learning behaviour in online learning settings and that students in online classes, as in traditional classes, set aside a regular time to concentrate on the course. Also, institutions should provide user-friendly online learning platforms and workshops for instructors and students to facilitate the teaching and learning experiences.

Moreover, another study was conducted at University of Tulsa USA in 2013 with the purpose of exploring the relationship between self-directed learning and academic achievement. Ninety-six undergraduates were selected as a sample to work on projects with three subtasks (idea generation task, methodical task and data collection) in a blended learning environment. Task self-efficacy was measured with self-reports administered during each subtask. Learning strategies were assessed by counting each instance of strategy use as it occurred in peer-to-peer conversations typed into a computer software system. Results showed that for each subtask, learners with higher task self-efficacy had higher task performance. Those who used more learning strategies on each subtask also had higher performance. In turn, high performance was associated with high self-efficacy on subsequent subtasks. Surprisingly, results showed that task self-efficacy and learning strategy use were

not significantly related during any subtask. Overall, results imply that task self-efficacy, learning strategy use and past performance are important predictors of task performance (Karvounidis, Chimos, Bersimis, & Douligeris, 2014).

By the end of 2013, an academic project utilized a Web-based tool, Google Docs, to determine the effects of Web-based collaboration on vocabulary improvements among learners of English as a foreign language (EFL). The work performed in this study represents a further step toward identifying the factors that influence self-regulated vocabulary strategy use and perceptions of Web-based collaboration (SR-vs-WBC). In total, 210 undergraduate students participated in this study and undertook the designed tasks, such as vocabulary pre-/post-tests and a self-report questionnaire survey of SR-vs-WBC. The findings of the study suggest that collaboration using a Web-based tool affects knowledge development and provide insights into the integrated continuum of self-regulation, L2/FL learning, and Web-based technology that will be useful for pedagogy (Suwantarathip & Wichadee, 2014).

Likewise, a research was submitted in 2014 in the USA. The research targeted the learning preferences, goals and motivations, achievements, challenges, and possibilities for life change of self-directed online learners who subscribed to the monthly Open Course Ware e-newsletter from MIT. Data collection included a 25-item survey of 1429 newsletter subscribers; 613 of whom also completed an additional 15 open-ended survey items. The 25 close-ended survey findings indicated that respondents used a wide range of devices and places to learn for their self-directed learning needs. Key motivational factors included curiosity, interest, and internal need for self-improvement. Factors leading to success or personal change included freedom to learn, resource abundance, choice, control, and fun. In terms of achievements, respondents were learning both specific skills as well as more general

skills that help them advance in their careers. Science, math, and foreign language skills were the most desired by the survey respondents. The key obstacles or challenges faced were time, lack of high-quality open resources, and membership or technology fees. Among the chief implications is that learning something new to enhance one's life or to help others is often more important than course transcript credit or a certificate of completion (Bonk, Lee, Kou, Xu, & Sheu, 2015).

Another survey was conducted in the same year but now in China. The survey's purpose is to scrutinize the usefulness of Web 3.0 podium. The survey targets the extent of knowledge, willingness, and skill of language learners to engage in self-directed use of technology. A group of undergraduate students participated in a 12-week training. Analyses of students' survey responses prior to and after the training indicated that the training program was effective in inducing a greater frequency of self-directed use of technology for language learning and in promoting a greater willingness and stronger knowledge and skill base in support of such learning behaviour (*ibid*).

Additionally, a study was conducted in spring 2014 at Anyang University of Korea. The study seeks to explore the effects of smart-based flipped learning activities on learners' self-directed learning and academic performance. Hence, 112 sixth-grade students in the elementary school Pin Gympo-si, Gyeonggi-do South Korea were selected as this research experiment group as well as the control group (traditional ICT-based class learning). They were examined for 11 weeks from the 2nd week of March to 2nd week of May 2014. In the Flipped classroom based on smart learning, the informants studied at home in advance with materials made by their teachers. Then, in class, they searched data instantly by using smart pads, used applications for learning or as a tool, and conducted online evaluation, etc. The

normal flipped-learning based education group studied at home in advance with videos made by their teachers and, in class, they were instructed to focus on knowledge sharing among themselves and discussions. As a result, an effect on study achievement was found between the flipped learning and traditional ICT-based learning methods. Moreover, the smart-based flipped learning was found to have improved self-directed learning ability more than the general flipped learning and traditional ICT-based method. Collaborative learning ability and information use ability were found to be more improved with statistical significance in the smart-based flipped learning group than the other groups (ibid).

In 2015, a study was conducted in USA about enrolment in Web 2.0 educative mathematics courses and how it increased in popularity in institutions of higher learning; however, students unskilled in autonomous learning find online remedial mathematics courses particularly challenging. The study investigates the role of autonomous learning, specifically motivation, emotion, and learning strategies, in students' learning experiences in a remedial online mathematics course. With a Web 2.0 survey of 229 college students, the outcome highlights that student motivation explained a small portion of variance in achievement; whereas, student motivation and emotion explained a significant portion of variance in satisfaction. In addition, significant differences in motivation and emotion were found in passing and non-passing students; however, learning strategies did not influence student achievement and satisfaction (Karvonidis et al., 2017a).

In a similar work done at the University of Piraeus of Greece in 2016, Web 3.0 applications in higher education were assessed using students' perceptions, satisfaction, performance and behaviour. The study evaluates the Web 3.0 tools as stand-alone entities as well in terms of their cross-operability and integration (confluence) to synergistic

contributions towards the enhancement of student learning. Significant correlations and interdependencies on the students' behaviour over the used platform and their performance in various time points within the course time line have been revealed (Karvonidis et al., 2017b).

Equally, a Malaysian project was submitted in 2016 about Web 3.0-based informal learning of ESL. The main research question considers how ESL learners account for the strategies of Web 3.0-based ESL learning when they engage with these tools in informal, learning settings. Questionnaires were used to generate quantitative data from the university student population (N=400) through an on-line self-reported survey. Results suggest that the majority of the Malaysian university students (ESL learners) surveyed use learning strategies with Web 3.0 tools for their English informal learning that are intentional and purposeful, and provide valuable lifelong learning experiences too. Powerful-shared intentions and thoughts guide actions, shared practice and sociocultural mediation through Web 3.0 tools and roles in this informal learning activity system, locally and globally. These learners also seek help from their peers and their own independent research, using Web 3.0 tools to practice in communicative language learning environments outside of the classroom in more relaxed atmosphere. This media has enabled students to adopt new learning behaviours, cooperative practice, mutual engagement and responsibilities consistent with the realities of a rapidly changing virtual community. The participants also expressed strong positive experiences and perceptions towards learning strategies with Web 3.0 tools towards their meaningful English informal learning (Wan, Prain, & Collet, 2014).

An additional paper was submitted at the end of 2014 about the incorporation of Edmodo as a Web 3.0 application. The paper investigates the prospects of integrating Edmodo into Saudi EFL female secondary school instruction. It concentrates on students' perceptions

and challenges regarding Edmodo use and its effect on their attitudes towards EFL learning. The 42 participants were divided into two groups. The experimental group received traditional teaching plus a six-week daily interaction via Edmodo. The control group received traditional teaching only. Findings of the post-treatment questionnaire show that students' perceptions towards Edmodo were highly positive and that although there were considerable challenges to its integration, it appeared to have excellent potential for generating more positive attitudes towards EFL learning (ibid).

A similar study examined the correlation between Web 2.0 SDL and academic achievement of 300 EFL undergraduate students at Moulay Ismail University in Meknes. The outcome reveals that Web 2.0 SDL is highly positively correlated with academic achievement. At different dimensions of the SDL, male and female EFL graduate students do not differ. The implications which come to the surf are that Web 2.0 SDL creates substitutions in academic achievement among students. As well, a person who possesses SDL and manipulates Web 2.0 will also achieve more in his/her academic activities. Moreover, SDL is an increasing factor of academic achievement (Boulaid & Moubtassime, 2016).

Later in 2017, an investigation was led at Hacettepe University of Turkey with the aim of shaping different groups of learners obtained from Moodle logs based on their approaches to learning (Akçapınar, 2015). Relationship between these groups and their academic performance was also investigated. The participants of the study were 62 third year undergraduate students enrolled in a Relational Database Management System course. Learning approaches of students were measured at the end of the course by the Biggs's Revised Two Factor Study Process Questionnaire (R-SPQ-2F). Students are divided into groups according to their Moodle usage logs using the clustering analysis. Three groups of

students were obtained according to the results of the analysis. These clusters are labelled based on students' R-SPQ-2F subscale scores. Results revealed that students mostly engaged in Moodle course got the highest deep learning scores, and the lowest surface learning scores. Their average academic performance was also higher than that of in other clusters. On the other hand, non-active students in Moodle got higher surface learning and lower deep learning scores. Their average academic performance was also lower than other groups (Akçapınar, 2015).

Conversely, the purpose of another study that was done in Kenya was to investigate the influence of self-regulation of Facebook usage on academic performance among Kenyan university students (Wanjohi, Mwebi, & Nyang'ara, 2015). To achieve this objective, the study employed the ex post facto research design. Purposive and stratified random sampling methods were used to select participating campuses ($n=4$) from ($N=12$) and students ($n=348$) from ($N=2698$) third year regular students. Data was collected using a self-administered questionnaire. The findings revealed that there was a moderate level of self-regulation on Facebook usage by university students thus depicting ambivalence in attitude towards controlling the urge to use Facebook when in site. Further, it was found that there was a significant relationship between the level of Facebook self-regulation and academic performance ($p<.01$). The implication of this finding was that the more one-self regulates, the higher the likelihood of improving in academic performance. From the findings, it is recommended that universities incorporate time management skills in the curriculum in order to help the students achieve balance between leisure activities and academics.

Again, a longitudinal study (Misook, 2015) was conducted with the purpose of examining student attitudes towards the course effectiveness factors for language proficiency

as well as learner self-directed learning in a blended Korean language course. American students who attended intermediate and advanced blended Korean language courses applied the LMS, Sakai in 2014, 2015, and 2016 at the Osan Language Training Detachment (LTD), and they were invited to participate in the anonymous, open-ended online survey. The outcome revealed that blended Korean language course was effective for language learning and achievement, but only 50% of participants stated it was effective for the improvement of autonomous learning skills (Gardner, 1985).

Moreover, a mixed-method research has been conducted in 2016 at Tasmania University in Australia. The research meant to develop and implement a personal digital habitat, namely digiMe, for medical students and educators at an Australian university. The first stage, however, examined the types of Web 3.0 tools and mobile devices that are being used by potential digiMe users, and reasons for their adoption. In this stage of research, data were collected through a questionnaire and semi-structured interviews. Questionnaire data collected from 104 participants were analyzed using the Predictive Analytics Software (PASW). Frequencies, median and mean values were pursued. Kruskal Wallis tests were then performed to examine variations between views of different participant groups. Notes from the 6 interviews, together with responses to the open-ended section of the questionnaire, were analysed using the constructivist grounded theory approach, to generate key themes relevant to the adoption of Web 3.0 tools and mobile devices. The findings reflected the wide use of mobile devices, including both smart phones and computing tablets, by medical students and educators for learning, teaching and professional development purposes. Among the 22 types of Web 3.0 tools investigated, less than the participants frequently used half of these tools, this reflects the mismatch between users' desires and their actual practice. Age and occupation

appeared to be the influential factors for their adoption. Easy access to information and improved communication are main purposes. In short, the research project highlights the desire of medical students and educators for a more effective use of Web 3.0 technologies and mobile devices, and the observed mismatch between the desire and their actual practice. It also recognizes the critical role of medical education institutions in facilitating this practice to respond to the mismatch (Fan, Radford, & Fabian, 2016).

Recently, a quasi-experimental study (Salem, 2017) scrutinized the effect of WebQuest-Based Program as a Web 3.0 Apps on the enhancement of students' listening and speaking skills at Temay AlAmdid General Secondary School in Egypt. Forty (40) students took part in the project, and they were divided into two equal groups: an experimental group (n= 20) and a control one (n= 20). The researcher used two pre-post-tests of listening and speaking, a speaking assessment rubric, and a reflection log for students to evaluate each WQP. The outcome of the study revealed that there were statistically significant differences at the level (0.05) between the mean scores of the participants of the experimental group and those of the control group on the post application of the listening test in favour of the experimental group; there were statistically significant differences at the level (0.05) between the mean scores of the participants of the experimental group and those of the control group on the post application of the speaking test in favour of the experimental group; there were statistically significant differences between the mean scores of the experimental group members on the pre and post application of the pre post-test of the listening test in favour of the post application; there were statistically significant differences between the mean scores of the experimental group members on the pre and post application of the pre post-test of the speaking test in favour of the post application. Hence, the effect size of the WebQuest program

was found to be high in enhancing and developing the listening and speaking skills of the secondary school students. The study recommends using the WebQuest as a technique in teaching EFL skills and as a training approach in professional development programs of EFL teachers.

A similar study has been done in the same year with the purpose of exploring the position of using Web 3.0 inside Moroccan higher education classroom in the reinforcement of university students' motivation since it is the pivot that retains their active learning. The study accordingly exhibits the extent to which Web 3.0 technologies pave the way for students to remain involved asking, responding, and interacting with their instructors and peers. This small-scale study targets ninety undergraduate students of English Department at School of Humanities, Sidi Mohamed Ben Abdellah University in Fes. Sixty students accepted to take part in the study, yet only thirty-nine who filled in the questionnaires exhaustively. The informants were taught with the help of some Web 3.0 Apps such as Kahoot, Edmodo, Webinar, and BookWidgets and the project lasted five weeks. Analyses of the questionnaires' responses prior to and after the exposure to Web 3.0, which were administered to a convenient sampling, reveals Web 3.0 significantly contributes to students' sustainable active involvement (Boulaid & Moubtassime, 2017).

Another study was conducted in the same year (Al-Essa, 2017) to explore the effect of improving Saudi female EFL students' grammar through the incorporation of Edmodo as a Web 3.0 App. Forty-four (44) EFL female students from the Eleventh grade were the participants of the project, they were divided in two groups: 22 participants in control group and 22 participants in experimental group. Grammar pre-post-test, and a five-point Likert scale questionnaire were utilized to collect data. The results displayed that there were

statistically significant differences between the achievement of the experimental group and the control group on the post grammar test which indicated the effectiveness of incorporating Edmodo in teaching grammar to EFL students.

Lastly, a collective study (Iwamoto, et al. 2017) was run to explore the usefulness of Kahoot as a Web 3.0 App in addressing low high-stakes examination scores. This was accomplished through the introduction of an online quizzing application that utilized Kahoot. The findings of the study confirmed a significant difference in high-stakes examination scores for students who used Kahoot versus students who did not. Also, participants who used Kahoot expressed their satisfaction about their experience.

Similarly, the findings of a recent study also imply that students accept formative assessment through Kahoot as a fun learning activity (Moubtassime & Boulaid, 2019). Students are likely to spend more time on the course if it is enjoyable, engaging, and fun. It is worth noting that students respond positively to learning activities that allow them to interact with their teachers and receive immediate feedback. This can be incorporated in Kahoot during a teaching session in classroom.

Chapter Two: Research Methodology

The previous chapter introduces a review of the existing literature and prior studies relevant to the ILOs, SDL, and Web 3.0 and how university teachers perceive and make use of new technologies in their teaching process. This dissertation is driven by the exploration of university students and teachers' awareness, satisfaction, and competence in Web 3.0 usage and how the latter empowers SDL. A further intention of the dissertation is to become an added value to the academia and to update the current literature that deals with the educational technology.

This chapter introduces the research methodology that is used to determine if university students develop their SDL thanks to the integration of Web 3.0 applications. The chapter also illustrates the way teachers integrate such applications and how knowledgeable they are while working with this software. The sample, sampling, procedures, design, and data collection and analysis are also discussed.

The present study is concerned with the use, competence, and satisfaction of university students in being self-directed learners thanks to Web 3.0 Apps. This chapter provides a thorough description about the methodology adopted in this dissertation and the procedures and statistical tools implemented to test the hypothesis and answer research questions. Hence, a sequential exploratory mixed-method is opted for (Creswell, 2007; Miles & Huberman, 1994). For the sake of a brief explanation, Creswell (2007) describes this method as a unique type of investigation in such a way that the initial qualitative stage of data collection and analysis is

followed by a second phase of quantitative data collection and analysis that builds on findings of the first qualitative phase. Weight is generally placed on

the first phase, and the data are mixed through being connected between the qualitative data analysis and the quantitative data collection...the purpose of this strategy is to use quantitative data and findings to assist in the interpretation of qualitative finding...the primary focus of this model is to initially explore a phenomenon (p. 211).

This sequential explanatory design gives floor to student to express themselves in two different sequences in addition to teachers' sequence. On the one hand, the first sequence which stands for students' online questionnaires is meant to gathers students' attitudes, frequency of use and overall satisfaction with the integration of Web 3.0 applications, while the third sequence is to bring to light students' real proficiency in the use of Web 3.0. On the other hand, the second sequence invites teachers to share their awareness and level of proficiency as well as frequency of use as to the Web 3.0 technologies.

The reason behind using the sequential exploratory mixed-method is to explore the correlation between the different constructs where the researcher should consider "an approach to research where the independent variable was usually continuous" (Gliner et al., 2011, p. 50). The measurement scales opted for in this thesis are the SRSSDL⁵ adjusted by (Guglielmino, 1997) and the DigCompEdu⁶ developed by (Redecker, 2018). Details are presented in the next sections.

2.1 Empirical Description

The empirical part of this thesis is a quantitative in nature and qualitative in meaning, based on data collected from fieldwork which measure the use and usage of Web 3.0 among

⁵ SRSSDL: Self-Rating Scale of Self-Directed Learning

⁶ Digital Competence for Educators

students and teachers in three Moroccan universities: Sidi Mohamed Ben Abdellah University in Fes, Moulay Ismail University in Meknes, and Al Akhawayn University in Ifrane. Such a measurement is conducted through the use of DigCompEdu⁷ scale (Redecker, 2018), which deeply contributes to scrutinizing the associations and relationships between research factors and how they explain the use of Web 3.0. As such, DigCompEdu is used to rate the technological competency gap, which is the discrepancy between students' actual proficiency and their potential use of Web 3.0 Apps in the enhancement of their SDL. As well, the five Web 3.0 technologies constructs are explored: Awareness, Use, Attitudes, Satisfaction, and Competence.

To fulfil the above purpose, a sequential exploratory mixed method is used (see Figure 4 below). Creswell (2003) considers the sequential exploratory mixed-method as a means to "... use qualitative data and results to assist in the interpretation of quantitative findings.... The primary focus of this model is to explore phenomena" (p. 215). The latter stands for Web 3.0 applications and how they are used among university students and teachers. This implies that the results emanated from the first qualitative sequence and the second qualitative sequence enlighten data achieved through the third quantitative sequence, which suggests a new-fangled interpretation in the mixed three sequences (Figure 4 below).

The first sequence is based on an online questionnaire administered to students of SMBAU, MIU, and AUI. This sequence comprises responses to students' online questionnaire (see Appendix A). This has five sections ranging from demographic items via Web 3.0 knowledge attitudes to satisfaction and competence. Generally, an online

⁷ DigCompEdu is a European framework for the digital competence among educators.

questionnaire, which consists of sixty questions, were administered to nine hundred students from the three universities, yet only five hundred and eighty questionnaires were exhaustively filled out coded and profoundly analyzed (see chapter three). The respondents are aged between eighteen and more than thirty years old and represent both female and male participants, with fair representativeness of the three universities. It is worth mentioning that the questions vary from close-ended questions, open-ended questions, Likert scale, and multiple-choice questions.

The second sequence is based on another questionnaire sent to teachers from the same institutions (see Appendix B). This sequence deals with teachers' answers which are grouped into four categories ranging from teachers' demography, attitudes, Web 3.0 use and their competence. This sequence is meant also to examine teachers' readiness to incorporate Web 3.0 technologies in their classroom activities with the aim of empowering students' SDL. Similarly, an online questionnaire was administered to forty-five aged-teachers between twenty-five to more than fifty-five years old from the same three institutions -with fair distribution⁸. These respondents' teaching experience varies from less than three years to more than twenty-one years.

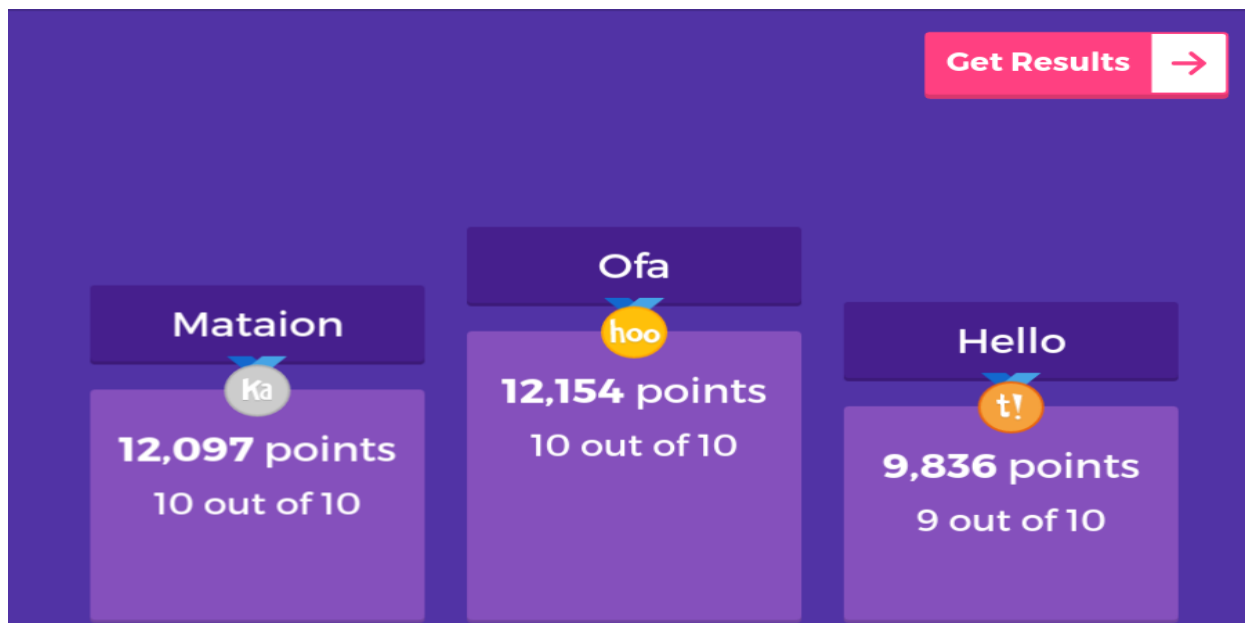
Third sequence is based on a quasi-experimental design testing student exposed to Kahoot⁹ a real Web 3.0 application. In this sequence, forty-nine participants could stay engaged for the whole period of the experiment (seven weeks) and thoroughly filled out the two phases of the questionnaires -at the beginning and by the end of the project. The

⁸ Fifteen teachers from each university

⁹ Kahoot is an online game-based application (see a full section in page 34).

participants are university students of English as a foreign language at the school of humanities in Moulay Ismail University, Meknes. A PowerPoint presentation about Kahoot was delivered to the participants during the first session with the hope of familiarizing them with the conceptual framework of Web 3.0 and Kahoot in particular. The experiment lasted for seven weeks, and in each week, the informants were exposed to a different Web 3.0 Application: Kahoot, Edmodo, Wheel Decide, Edublog, and BookWidgets. The learning process was conducted in an interactive funny way, and the learners were required to respond to multiple-choice Kahoot Quizzes and Jumble created by the researcher in advance, and students compete individually and in team to win points through different gamifications using their mobile phones and tablets. By the end of each session, five winners were given incentives (books and chocolates).

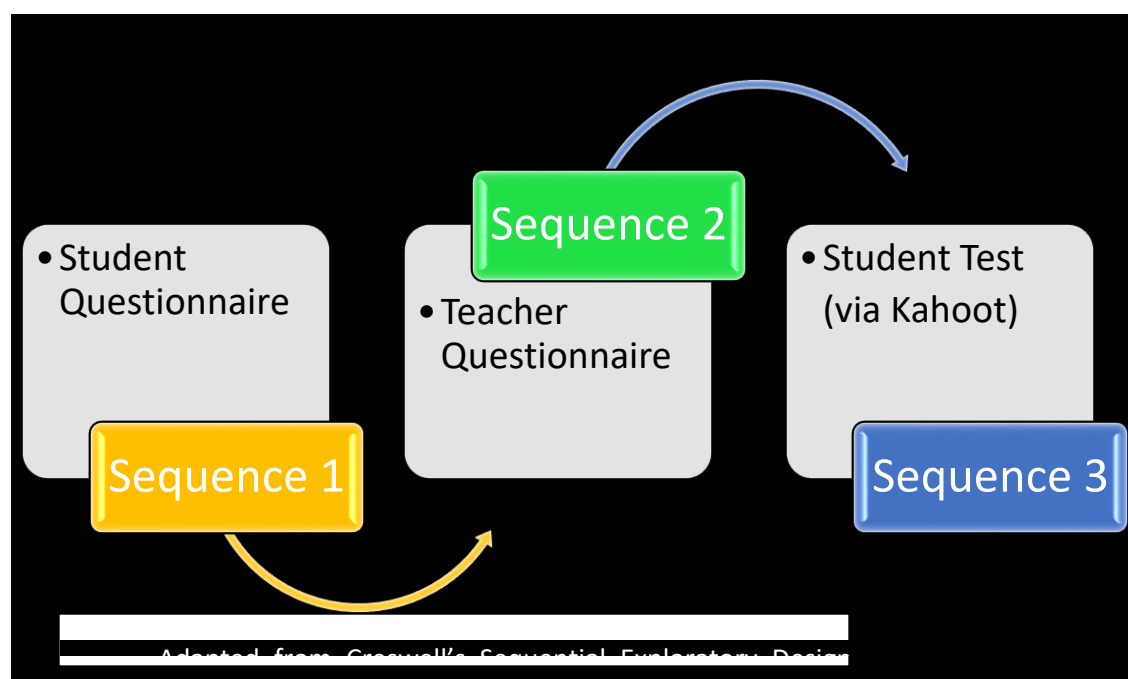
Figure 3 A Sample of Top Winners in a Kahoot Game



The respondents were administered online questionnaires in two different phases: before they were exposed to the applications and by the end of the seventh week of the study.

The aim of the questionnaire was to enlist the participants' rate of input and their perception as well as level of proficiency in the use of Web 3.0 Applications in their learning process. The teacher (participant observer) saved all the games' results displaying the three top winners (see Figure 3 above) and extracted excel reports of all players and kept them on a weekly journal for final observation and analysis. The participants were also asked to keep track on their online journals. The latter were observed along with students' rate of participation throughout the project. Data analysis on the pre- and post-tests was conducted using ANOVA¹⁰.

Figure 4 The Sequential Exploratory Design



To illustrate, a sequential design provides the researcher with the opportunity to increase plausible outcomes to research questions fusing different methods (Bryman, 2006; Creswell, 2003; Creswell & Plano Clark, 2011). The researcher can thus enrich the findings'

¹⁰ ANOVA means analysis of variants

“why” and “what” generated respectively from the different sequence. Indeed, sequential explanatory design is used to infer qualitative results to assist in the explanation and interpretation of a primarily quantitative study. For the purposes of this study, the sequential explanatory study is as follows: The quantitative side is in correlation and predictive research, which investigates the relationship between the students’ knowledge and satisfaction with the use of Web 3.0 in the enhancement of their SDL. The second sequence examines teachers’ awareness and readiness to incorporate Web 3.0 in the teaching process to empower students’ SDL. The third sequence scrutinises students’ perceptions and level of proficiency in the real use of Web 3.0. However, a possible drawback of a sequential design is the sense that the duration of the fieldwork is likely to grow as one sequence cannot begin until the previous sequence is done (Walsh, 2014).

Besides, the research paper displays the rapport of the findings from the three sequences and the ILOs pedagogical vision so as to infer the students SDL readiness and teachers’ willingness towards the potential incorporation of Web 3.0 technologies. Depending on the outcomes derived from these sequences, the researcher attempts to suggest Web 3.0 Apps as an ILO 3.0 learning Model.

The research units of this study comprise students and faculty members from schools of humanities in three Faculties of three Moroccan universities: Sidi Mohamed Ben Abdellah Dhar El Mahraz Fes, Moulay Ismail University Meknes, and Al Akhawayn University Ifrane. Detailed information about the sampling unit is referred to in Chapter four.

2.2 Research Instruments

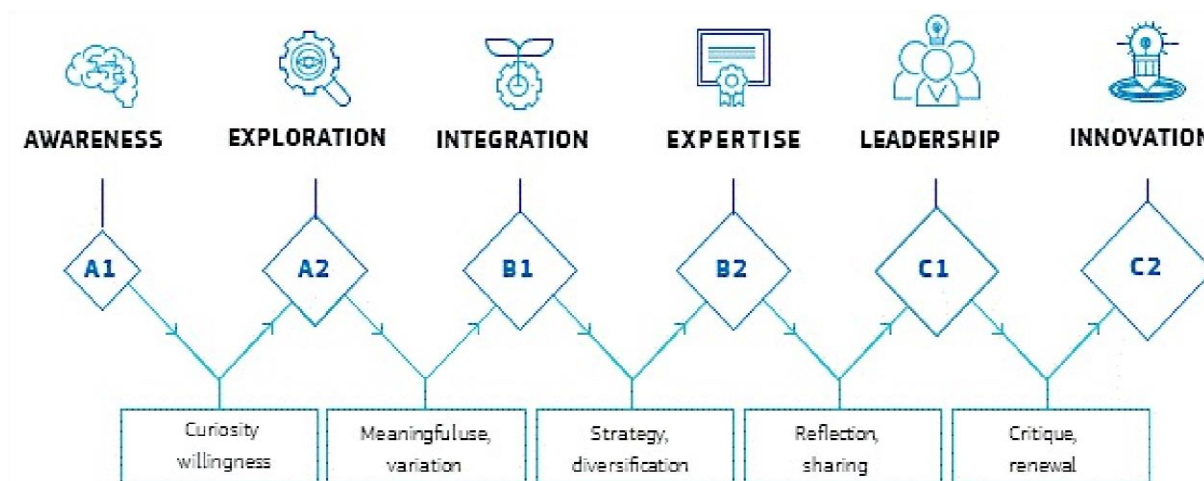
The researcher uses online questionnaire for the two first sequences entitled “Web 3.0 in Higher Education” and a pre-test-post-test survey for the third sequence. All the

questionnaires are adopted and adapted based on the DigCompEdu Model designed by Redecker (2018). The latter is initially developed to measure the level of digital proficiency among teachers. This comprises four major features concerning participants' incorporation of Web 3.0 Apps in their teaching and learning strategies. The first feature stands for the basic knowledge of Web 3.0 most common technologies. The second feature stands for the frequency of using these technologies at school (from 1=never to 5= always). The third feature stands for the rate of satisfaction with the inclusion of these technologies in classroom activities (from 1= highly unsatisfied to 5= highly satisfied and 1= not useful at all to 5= very useful). The fourth feature stands for the level of competence in Web 3.0 Apps effectively and efficiently (from 1= no knowledge to 5 = proficient). It is worth mentioning that the questionnaires are slightly adjusted to fit students' familiarity and the research questions.

2.2.1 DigCompEdu

The DigCompEdu scale (see Figure 5 below) comprises six different proficiency levels, aligned with the Common European Framework of Reference (CEFR) language competence levels (Redecker, 2018). Within the framework, these levels are designed to describe typical stages and roles Internet users go through when using digital technologies into their online practices:

Figure 5 DigCompEdu Scale (Redecker, 2018)



First, the lowest level of competence is ‘Newcomers’¹¹, which stands for the fact that the user is not aware of the initials of the new technologies in teaching.

Second, a weak level of competence is ‘Explorers’¹² where the user becomes conscious of the importance of new applications is interested in exploring them to enhance academic and professional process. Here, the user uses applications in some areas of digital competence without following a reliable approach.

Third, a moderate level of competence is called ‘Integrators’¹³ where the user tries out some new online applications in different settings for different purposes, integrating them into different activities. The user can creatively use them to enhance diverse aspects of academic improvement. Still, this level means that the user has not yet grasped a thorough usage of these new technologies.

¹¹ ‘Newcomer’ stands for any digital illiterate

¹² ‘Explorer’ stands for any individual who can navigate through the Net

¹³ ‘Integrator’ stands for someone who teach/learn via the Net

Fourth, a high level of competence is referred to as ‘Experts’¹⁴, and this level implies that the user manages to manipulate a variety of recent online applications assuredly, creatively and critically to empower learning activities. Here, the user become more curious and open to new ideas, knowing that there are many things he has not tried out yet, and s/he can even decisively choose which application is useful for which situation.

Fifth, a higher level of competence stands for ‘Leaders’¹⁵, which provides the user with a steady and complete approach to working with different applications smoothly in order to improve educational practices. This level offers an extensive digital storage of applications from which the user could pick up the most appropriate app depending on a given setting. The user here regularly uses his/her critical thinking to enhance his/her academia. Users as ‘leaders’ become a source of inspiration for others and are able to exchange with peers and cope with novel technological concepts.

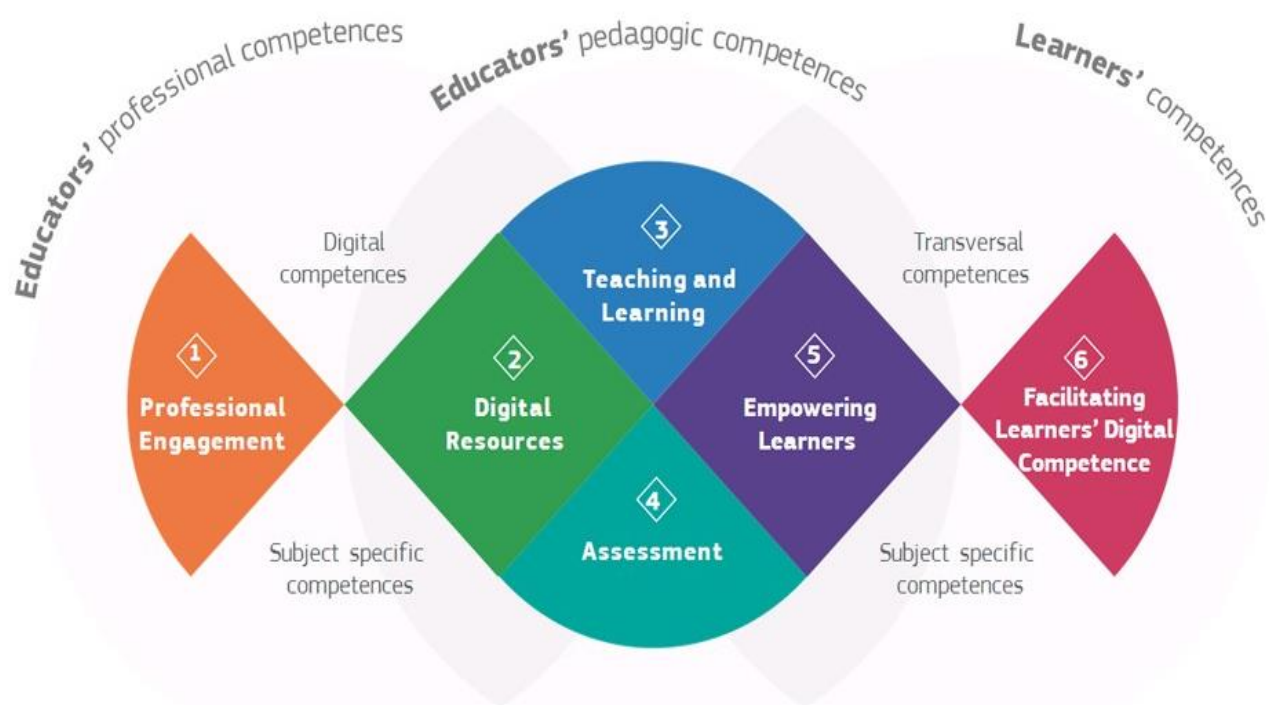
Sixth, the highest level of competence is the ‘Pioneers’¹⁶ which puts the user in a tremendously exclusive and rare class in the sense that they are able to shake and assess the suitability of current technologies and their academic importance. This level means that the user is no longer a consumer, but rather a producer as s/he can infer the pitfalls of each technological application s/he is working with. The user could even generate new technological learning strategies and approaches. The teacher leads innovation and is a role model for younger teachers.

¹⁴ ‘Expert’ stands for an experienced navigator who can even edit the Net

¹⁵ ‘Leader’ stands for a skilful navigator who can teach other and provide examples.

¹⁶ Pioneer’ stands for a proficient navigator who can run workshops about the Net

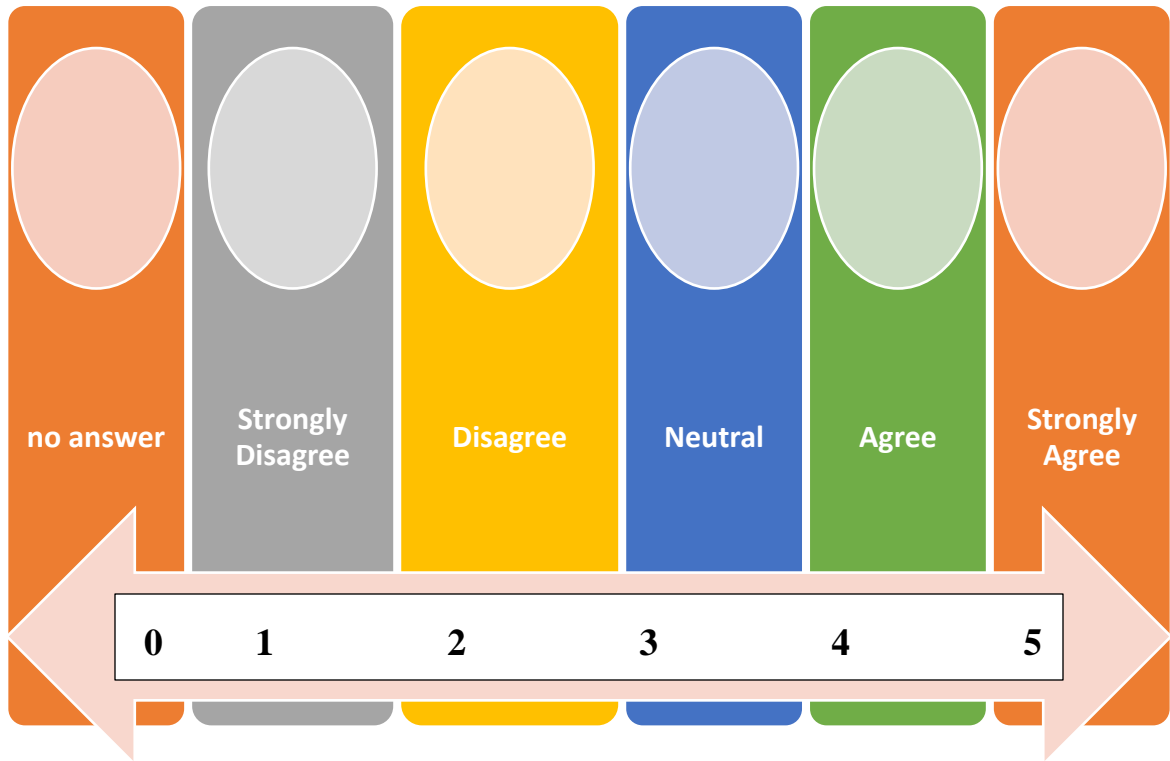
Figure 6 DigCompEdu Framework (Redecker, 2018)



Furthermore, the DigCompEdu framework (see Figure 6 above) has been developed for the benefit of every learning stand from K-12 to higher education (Benali, et al, 2018). This encircles general and vocational education and training, special needs education and non-formal learning contexts. The framework highlights the potential importance of new technologies in the empowerment of advent teaching-learning strategies and approaches (ibid).

In this study, the DigCompEdu questionnaire was attuned to suit students' understanding of the context. The 5-point Likert scale used to measure DigCompEdu has been revisited to include a "no answer" point having the level (0), which became a 6-point Likert scale (see Figure 7 below) with a slight modification of the questions.

Figure 7 The Five Category Likert Scale used in the DigCompEdu Questionnaire



2.2.2 SRSSDL

The SRSSDL was adjusted by Gugliemino (2007) to assess students' SDL scales. Every individual's SDL characteristics are rated from very low to very high based on Likert scales. The first sequence questionnaire comprises the SRSSDL thirty questions that are divided into six SDL dimensions: learning needs awareness, learning initiative, learning goals setting, learning resources identification, learning strategies implementation, and learning outcomes evaluation. First, lower SDL rate in the SRSSDL stands for a call to teachers to fully monitor the students and suggest a follow-up to improve self-directedness. Then, the average SDL rate implies that the student is at the midway to attain a self-directed learning roof, and the teacher has to facilitate the task for such a student to figure out her/his learning strategies and regulate them according to learning needs. Finally, a high SDL rate means that the student becomes an effective self-directed learner. Here, the teacher is supposed to assist

the student in keeping up this rank of self-directedness. Indeed a teacher can be a great asset to her/his students when they attain and attempt to sustain their SDL; s/he in the sense that can guide them to find out their learning desire and sense it an keep it strong (Belfakir, 2017).

2.2.3 Dependent Variables

The research questionnaire consists of the six SDL dimensions¹⁷ as dependent variables. The latter stand for ‘diagnosing needs’, ‘taking initiative’, ‘being responsible’, ‘participating in class’, ‘preparing for exams’, and ‘setting goals’. Table 1 (see below) displays a statistical description of the dependent variables, which are the six SDL dimensions (mentioned above).

Table 1 Six SDL Dimensions as Dependent Variables

Variable	Description
Diagnosing needs	Dependent qualitative ordinal variable
Taking initiative	Dependent qualitative ordinal variable
Feeling responsible	Dependent qualitative ordinal variable
Participating in class	Dependent qualitative ordinal variable
Preparing for exams	Dependent qualitative ordinal variable
Setting goals	Dependent qualitative ordinal variable

2.2.4 Independent variables

The research questionnaire consists of the eight independent variables, which compromise four demographic variables and four Web 3.0 variables. The former includes the variables of ‘age’, ‘gender’, ‘institution’, and ‘device ownership’, while the latter includes the variables of ‘Web 3.0 awareness’, ‘Web 3.0 use’, ‘Web 3.0 satisfaction’, and ‘Web 3.0

¹⁷ The six dimensions of SDL are well described in section 2 chapter 1.

competence'. Table 2 (see below) provides a detailed statistical description of the independent variables and their variant as well as how they are statistically coded.

Table 2 The Independent Variables

Independent Variables			
Variable	Description	Category	Code
Age	Nominal/Dichotomous Variable	18-21	1
		22-24	2
		25-29	3
		30-More	4
Gender	Nominal/Dichotomous Variable	Female	1
		Male	2
Institution	Nominal/Dichotomous Variable	SMBAU	1
		MIU	2
		AUI	3
Device Ownership	Nominal/Dichotomous Variable	Yes	1
		No	2
Web 3.0 Awareness	Ordinal Variable	Yes	1
		No	2
Web 3.0 Use	Ordinal Variable	Very frequently	6
		Frequently	5
		Occasionally	4
		Rarely	3
		Very rarely	2
		Never	1
Web 3.0 Satisfaction	Ordinal Variable	Highly Unsatisfied	1
		Unsatisfied	2
		Neutral	3
		Satisfied	4
		Highly Satisfied	5
Web 3.0 Competence	Ordinal Variable	No knowledge	1
		Basic concept	2
		Competent	3
		Proficient	4

2.2.5 Method & Sampling

For the sake of seeking generalizing the research outcomes over the whole population, a high sample's response rate is required (Levin & Greenwood, 2006). Hence, respondents are recommended to be designated according to their availability and convenience and they should represent some characteristic the researcher aims to examine, and the best specimen to meet such requirement is nonprobability convenience sampling (Creswell, 2015).

For this study, the research paper adopts a sequential exploratory mixed-method to explore undergraduate students who are currently enrolled at three Moroccan universities (SMBAU, MIU, AUI) and teachers who are currently teaching at the same institutions. The three universities are located in Fes-Meknes Region. A nonprobability convenience sampling is taken from the three universities due to the researcher's accessibility and ties to those university sites. The "response rate from the selected participants determines how well results can be generalized to the population as a whole" (Levin & Greenwood, 2006 p. 24). Further, since not all researchers could conduct a probability sampling in social research, one resorts to picking individuals that are available or convenient, where the respondents are likely to represent some characteristic the researcher seeks to study (Creswell, 2015).

The researcher administered an online questionnaire to the population of interest encompassing BA and MA students of English Department at the Faculty of Letters and Human Sciences of both SMBAU and MIU in addition to students from AUI. Furthermore, the questionnaire was shared through social media¹⁸. Besides, an online questionnaire was emailed to faculty members from the same affiliation. Then, a sample of students was exposed

¹⁸ The questionnaire was also uploaded on Facebook groups of English Department of both SMBAU and MIU and AUI SAO page.

to teaching experience through Kahoot as one of the recent Web 3.0 applications. The research relies on three surveys—two administered to students in two different sequences and one administered to teachers at another sequence—at three different Moroccan universities (see Appendix A). All the surveys shared a core set of items about Web 3.0 awareness, satisfaction, and competence and each sequence has an adjusted set of items specific to each specific audience (student/faculty).

Upon accomplishment of the data collection from the three sequences, descriptive and cross tabulation data analyses are conducted. These analyses describe ways Moroccan university students and teachers use Web 3.0 technologies synchronously and asynchronously, their rate of use between the devices and applications of the two groups and determined any significant differences between Web 3.0 usage amongst students and instructors.

In short, the purpose behind recruiting participants for the study from three different institutions and different levels is to bring together different learning environments and thus attain higher participation rate.

Restating Research Questions

For the sake of reminding the reader of the objectives and research questions of the thesis, the outcomes referred to in this chapter provide a descriptive answer to the five central research questions of this study which are:

- Q1- Is there any significant correlation between different demographic variables and the use of Web 3.0 as a way of SDL learning?
- Q2- Are students and teachers aware of the educational role of Web 3.0?

Q3- Are students and instructors satisfied with the incorporation of Web 3.0 in ILOs?

Q4- Are students and instructors ready to use Web 3.0 in the enhancement of SDL as ILO?

The research design of this thesis follows a sequential exploratory mixed-method with the aim of finding plausible answers to the four research questions and inferring a profound understanding of how university teachers develop their students' SDL through the integration of Web 3.0 technologies in their pedagogical activities. Improving students' SDL is characteristically multifaceted and dependent on many factors. Hence, there has been an advantage to explore the practical usage of Web 3.0 in different educational settings to observe by means of "multiple lenses simultaneously" (Mertens, 2015, p. 304). Table 3 provides a description concerning the connection between the four research questions and the research method that is most appropriate to scrutinise each question.

Table 3 *Research Questions and Research Design Connection*

Research Question	Quant	Qual
RQ1. Is there any significant correlation between different demographic variables and the use of Web 3.0 as a way of SDL learning?	√	
RQ2. Are students and teachers aware of the educational role of Web 3.0?		√
RQ3. Are students and instructors satisfied with the incorporation of Web 3.0 in ILOs?		√
RQ4. Are students and instructors ready to use Web 3.0 in the enhancement of SDL as ILO?	√	

2.2.6 Restating the Hypothesis

The present study explores university learners' and instructors' understanding and attitudes to the idea that the incorporation Web 3.0 Applications could enhance self-directed learning. Based on the above questions, the following hypotheses are formulated:

- H₀: There is no relationship between learners' Web 3.0 interaction and their self-directed learning.
- H₁: There is a significant correlation between learners' Web 3.0 collaboration and their self-directed learning.
- H₂: EFL learners prefer much more virtual interaction rather than face-to-face.
- H₃: Students take initiative and responsibility for learning thanks to the use of Web 3.0.
- H₄: The more students are engaged with Web 3.0, the more achievement of SDL they might enhance.
- H₅: EFL learners select, manage, and assess their own learning activities while using Web 3.0.

2.3 Pilot Study

A pilot study is fundamental in the sense that it offers an optimum scheme to make sure the research method is correctly built and that the items included in the survey have lucidity for the participants; such refinement of the survey encourages respondents to complete the survey (Hassan et al., 2006). Besides, the pilot study is considered as a statistical trial of the research tools, data collection and analysis in the sense that it paves the way for plausible sample recruitment strategies and creating a smooth groundwork for a larger study (ibid).

Within the aim of conducting a fruitful thesis, a pilot study was run in Spring 2017. One hundred and twenty-one EFL students enrolled at the English Department, School of Humanities and Social Sciences at Moulay Ismail University in Meknes participated in the pilot study. They were exposed to Edmodo, a Web 3.0 Application, for seven weeks. The participants were administered online questionnaires in two different phases: before they were exposed to Edmodo and by the end of the seventh week of the exposure. The aim of the

questionnaire was to enlist the learners' readiness to SDL and their attitudes to technological contribution in the enhancement of SDL (Boulaid & Moubtassime, 2017).

The objective of a quasi-experimental pilot study was conducted with the purpose of scrutinizing the role of Edmodo as a new Web 3.0 Application in promoting SDL. It thus highlighted the extent to which EFL learners were willing to engage, take initiative, diagnose learning needs, and evaluate their learning outcomes. The study targeted one hundred and one undergraduate students of English Department at MIU. Ninety-seven students accepted to take part in the study, yet seventy-five who filled in the questionnaires exhaustively. The informants were exposed to Edmodo, and the project lasted seven weeks. Analyses of the questionnaires' responses prior to and after the exposure to Edmodo, which were administered to a convenient sampling, revealed that the latter played a crucial role in promoting SDL.

2.3.1. Participants in the Pilot Study

One hundred and one undergraduate second semester EFL learners at Moulay Ismail University in Meknes accepted to participate in the study. I announced the study in the two classes I was teaching and recruited participants. After discarding the responses that were incomplete or did not have identifiers to allow the matching of the pre-survey and post-survey, ninety-seven participants' responses were included in this study. Of the ninety-seven participants, fifty-nine were female and thirty-eight were male. Their average age at the beginning of the semester was twenty-one, and the participants were studying Oral Communication (S2).

The exposure to Edmodo

A PowerPoint presentation about Edmodo was introduced to the participants in a face-to-face classroom, and the synchronous and asynchronous interaction Edmodo was hosted

online. The Oral Communication Subject was taught face-to-face (in class) and online (via Edmodo). The participants were invited to upload their personal activities such as videos (public speaking, stage performance, debating, etc.), audios (recording their talk), and documents (short stories, essay writings, idioms, etc.) through their Edmodo accounts which they had created in advance. They were also allowed to add their feedback and comments on other participants' contributions. The participation was relevant to course of Oral Communication.

The course of English Oral Communication is a collection of lessons and exercises designed for intermediate and advanced learners of English as foreign language. It offers materials for drills and practice in the general area of phonetics and phonology; the individual sounds, stress, intonation, etc. Within the framework of emphasizing the skills of English speaking, the focus of this course is to consolidate and improve oral communication skills in English through practical activities. In addition to some useful phrasal verbs, proverbs and idiomatic expressions are introduced

Prior to each session, the learners were sent a link of a new activity among the required elements of the course design in addition to a variety of exercises and quizzes. The feedback was online, but an exhaustive correction was in class.

Research instruments and procedure

The participants filled out a pre-exposure (to Edmodo) questionnaire at the second week of the semester. The incorporation of Edmodo was then introduced to the participants. The exposure to Edmodo, in the form of synchronous and asynchronous Edmodo interaction like as weekly assignments and face-to-face collaborative debriefing, lasted seven weeks.

Then, an equivalent post-exposure (to Edmodo) questionnaire was administered at the end of the study. The questionnaires were administered online applying google docs.

The questionnaires drew informants' demographic data, their views to Web 3.0 and Edmodo in particular as well as their actual readiness to SDL. Besides, various factors that are associated with SDL element such as motivation, initiation, responsibility, detecting learning needs, and outcome evaluation were included.

Frequency of Edmodo log in (seven items)

The informants were asked to report how much time they were using Edmodo per day and to what extent they used it for Oral Communication. They were also asked to report how many hours they stayed up doing homework on Edmodo, and how much time they were just discovering the usage of Edmodo (with no purpose).

Perceived usefulness of Edmodo for Oral Communication (seven items)

The participants were asked to rate on a Likert scale of 1–5 (strongly agree – strongly disagree) the usefulness of Edmodo for the course of Oral Communication. For instance, the participants were asked to report whether Edmodo helped them put into practice more activities of Oral Communication and whether they grasp them better.

Awareness and attitude to Edmodo for SDL (ten items)

The informants' perceptions were measured by three items that tapped into their enjoyment in using Edmodo for Oral Communication, for example: "I find Edmodo useful in supporting my understanding of Oral Communication." The participants rated the five items on a Likert scale of 1–5 (strongly agree and strongly disagree).

Situated understanding of the requirement for Edmodo use (eight items)

The subjects were asked to rate their perceptions of the institutional requirement for the incorporating of Edmodo by indicating the degree to which they agreed or disagreed with statements like: “It is absolutely necessary to use Edmodo if I want to obtain high grades in final exams”

Edmodo and EFL learners’ SDL (ten items)

The participants were asked to report the rate of their SDL readiness by indicating the degree to which they agreed or disagreed with statements like: “Edmodo helped me to manage my time”, “Edmodo helped me to take initiative”, and “Edmodo helped me to prioritize my work.”

In the post-questionnaire, the participants were also asked to report their frequency of accessing Edmodo, their evaluation of the experience with Edmodo, and the changes Edmodo had brought to their learning styles and SDL in general.

2.3.2. Data analysis of Pilot Study

A paired t-test was used to compare the participants’ pre-survey and post-survey responses to see whether there was any positive significance of the incorporation of Edmodo. In-depth comparative analysis of the frequent user and infrequent user of Edmodo during the seven weeks was also conducted through an independent t-test to identify whether frequency of accessing Edmodo produced different results. In addition, a chi-square test was conducted to examine whether there was a correlation between the frequency of Edmodo Logging in and reported changes of SDL.

Results

Effects of Edmodo

A comparison of the informants' answers in the two questionnaires before the exposure to Edmodo and after experiencing Edmodo reported a significantly greater frequency of SDL orientation in the post-test. They also reported significantly greater confidence in their knowledge and skills related to SDL readiness.

Other elements related to the participants' SDL, positive attitudes were reported towards Edmodo, positive attitudes of the compatibility of Edmodo with their learning needs' diagnosis and outcomes' evaluation, and positive perceptions of the subjects' expectations of Edmodo use for Oral Communication and SDL in the post-survey than in the pre-survey.

Additionally, 64 out of the 97 participants (67%) reported improving their SDL. The chi-square test between self-reported frequency of Edmodo and Oral Communication was significant indicating that the frequency of accessing Edmodo was correlated with the change in Mastering Oral Communication. A closer examination of the data showed that the majority of the frequent users (81%) reported promoting their SDL and thus developing their Oral Communication skills after experiencing Edmodo interaction. This finding confirms that

Edmodo was reported to have a positive effect on the informants' SDL especially among the participants who frequented Edmodo.

2.3.3. Discussion of Pilot Study

This study examined the effectiveness of Edmodo on EFL learners' SDL. The project lasted seven weeks to elicit the participants' responses from pre-questionnaire and post-questionnaire (before and after their being exposed to Edmodo). As an outcome the informant reported that they had frequented Edmodo several times, and they had spent more than two hours per day scrolling down on Edmodo. What is favourable is that Edmodo was reported to have contributed to promoting SDL. The participants in general reported a significant increase

in the frequency of their SDL. Hence, Edmodo was successful, as intended, in prompting a better use of most of the required elements of Oral Communication and improving key components of SDL.

2.3.4. Summary of the Pilot Study

This project explored the role of the incorporation of Edmodo as a Web 3.0 Application on EFL learners' SDL and the extent to which Edmodo contributed to learners' responsibility and the initiative they take to diagnose their learning needs and objectives and evaluate their learning outcomes. The survey targeted the association of Edmodo and the participants' learning process and accomplishment. The result revealed that Edmodo was fruitful in making a deeper understanding of Oral Communication individually, which implied a significant enhancement of SDL.

Enhancing SDL through Edmodo and Web 3.0 in general beyond the 'brick and mortar' classroom becomes mandatory if educators aspire to boost the incorporation of Web 3.0 (Benson & Reinders, 2011; Kormos & Csizer, 2014; Lai & Gu, 2011; Reinders & Darasawang, 2012). This quasi-experiment study aims at highlighting an insight how to empower a spirit of SDL among learners and instructors. The density of learners' online SDL process requires more research endeavours with the purpose of deepening an understanding of such important research area (Hubbard & Romeo, 2012; Lai & Morrison, 2013).

Once the pilot study was thru, internal consistency of questions related to a construct such as Web 3.0 awareness and satisfaction was validated by a Cronbach's alpha. Generally, 0.70 or higher is considered acceptable for social science research. Yet, and based on the feedback and time required to complete the questionnaire, some questions were rewritten for the sake of producing a comprehensible and smooth questionnaire.

2.4 Data Analysis Procedure

The data have been gathered and analyzed quantitatively and qualitatively using the 23rd version of the SPSS software (Pallant, 2016) for a better presentation of derived details through the research questions meticulously. The three sequences' qualitative and quantitative data are fused together in a way that is fascinating to contribute to the thesis better exploration and interpretation of the fieldwork (Creswell, 2013).

2.5 Consent of the Participants

The online questionnaires administered to students and teachers were filled out anonymously, yet consent forms (see Appendix C) were distributed to all students participating in the quasi-experiment study (third sequence of the research) who are enrolled in the second semester at the English department. Students who signed up the consent form participated in the study. In addition, assent was explained to learners orally during the first session of the experiment.

Summary of the Research Methodology Chapter

The sequential exploratory mixed-methods design chosen for thesis is driven by the research questions drawn previously, and. To consider the complexity of foreign language oral proficiency development in the high school classroom, a multifaceted inquiry style was required of this study. Thus, the researcher had determined that to answer the research questions, both quantitative and qualitative data had to be collected and analyzed.

This chapter provides details of the research methodology of the thesis. The latter conducted following a nonprobability convenience sampling with a sequential exploratory mixed-method. The final participant population is $N = 674$ students and teachers from three Moroccan universities (SMBAU, MIU, AUI). 580 students, 45 teachers, and 49 focused group

students. The instrument chosen for this study is the DigCompEdu Scale, developed by Redecker (2018). The following chapter, Findings and Data Analysis, presents the results of the data collected for this study. The following chapter provides the reader with full details of the findings generated through analysis of the three sequences.

Chapter Three: Findings and Data Analysis

This thesis has two primary areas of interest. First, the researcher aims at comparing the differences in satisfaction and competences as of the use of Web 3.0 among teachers and students. Second, the researcher seeks to understand the importance of the actual incorporation of Web 3.0 applications in the enhancement of students' SDL as an element of ILOs. Hence, this chapter displays the results of the three sequences of the research project. Thus, it provides a descriptive data of the students' questionnaires' responses, teachers' questionnaires' answers, and the tests' scores. The chapter reveals in detail the demographic items of the different informants, their awareness of the use of Web 3.0, their degree of satisfaction while using Web 3.0, and their level of competence as to digital integrity based on the DigCompEdu 2018 model.

Further, the chapter provides the reader with an explanation of the approach used to determine the reliability and validity of both quantitative and qualitative data and the results of the study based on major findings of the questionnaires. A combination of methodologies presents a clear understanding of the role of integrating Web 3.0 technologies in the learning process to improve university students' SDL as a basis of ILOs. A sequential exploratory mixed-methods design allows the researcher to thoroughly answer each of the research questions using both quantitative and qualitative data (Creswell, 2015; Plano Clark & Ivankova, 2016).

The statistical Package for the Social Sciences (SPSS) version 23 was used to calculate the descriptive and the inferential statistics. The questionnaires were recorded, and transcribed

all transcripts were entered into the HyperRESEARCH¹⁹ (Researchware, 2015) version 3.7.3 software to code the questionnaires and the questionnaires' comments. The researcher identified and named emerging themes within the groupings of codes as recommended in Auerbach & Silverstein (2003). Data analysis was conducted using IBM SPSS version 23 for all statistical analyses. Cronbach's²⁰ reliability coefficients were computed for each scale using the reliability analysis routine implemented in the SPSS software. In this study, a level of significance of .05 was considered statistically significant.

In short, the outcomes referred to in this chapter provide a descriptive answer to the four central research questions of this study which are:

- Q1- Is there any significant correlation between different demographic variables and the use of Web 3.0 as a way of SDL learning?
- Q2- Are students and teachers aware of the educational role of Web 3.0?
- Q3- Are students and instructors satisfied with the incorporation of Web 3.0 in ILOs?
- Q4- Are students and instructors ready to use Web 3.0 in the enhancement of SDL as ILO?

In addition to factor analysis, both descriptive and inferential statistical analysis are used to answer the four research questions in this study. All statistical analyses are carried out at an alpha level of 0.05, which is a commonly described statistical data in various studies (Bluman, 2010; Fraenkel et al., 2011). The analyses are reported next question by question,

¹⁹ HyperResearch is a software that assists in analyzing qualitative data

²⁰ Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability.

and the analysis of variance (ANOVA) is employed to deduce whether there are statistically significant differences among the means of the groups.

The first section presents descriptive analysis found from the survey questions in the three sequences, while the second section deals with factor analysis to deepen understandings of the research questions' findings. This section will first report the survey questions and the responses of students and teachers and follow up with correlated questions and responses. Connections between the three sequences are done and analyzed following the gathered outcomes.

3. Description of the Results

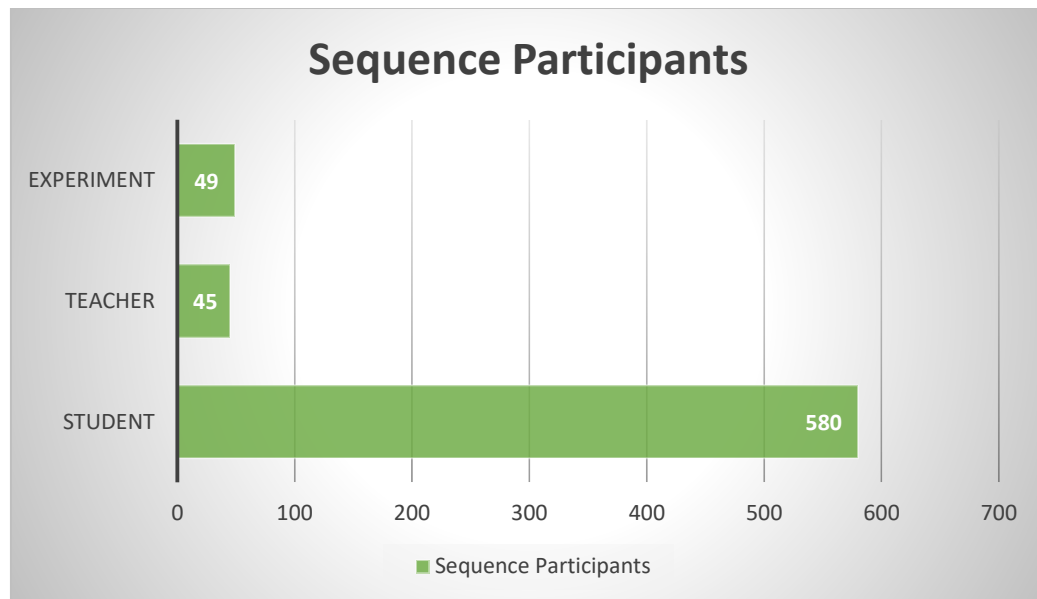
The data collected through this study is quantitative and from a nonprobability convenient sample (final: $N = 674$) using a sequential design. Gaining all consents and required permissions, data collection materialized over a period of five weeks from students and teachers in three Moroccan Universities: SMBAU, MIU, and AUI. Data collected from the three sequences is coded through SPSS and presented in tables and graphs.

To better display the sample size of the three sequences in one diagram, the researcher used a coding system and assigned a code to each sequence. The researcher then grouped all the informants into three categories based on their sequence. The students who were administered online questionnaires were grouped as "Std" and coded as "S1" (where S stands for sequence). In the same manner, the researcher grouped the teachers as "Tch" and coded as "S3", while the experimental students were grouped as "ExpSt" and coded as "S2".

Table 4 Number of participants in the three sequences

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Std	580	88,0	88,0	88,0
ExpSt	49	7,4	7,4	95,4
Tch	45	4,6	4,6	100,0
Total	674	100,0	100,0	

As demonstrated through the dashboard in Table 4 above and Figure 8 below, the breakdown of the research participants in each sequence were as follows: 88% students, 7.4% experimental students, and 4.6% teachers (N = 674, where N is the number of survey participants).

Figure 8 Number of participants in each sequence

The description of the finding is divided into three sequences. The first sequence comprises responses to students' online questionnaire. This sequence has five sections ranging from demographic items via Web 3.0 knowledge attitudes to satisfaction and competence. The second sequence deals with teachers' answers which are grouped into four categories ranging from teachers' demography, attitudes, Web 3.0 use and their competence. The third sequence encompasses students' experience as exposed to Web 3.0 application "Kahoot" and

it is divided into two phases. Pre-test and post-test results focusing on participants' satisfaction and competences.

Content Validity Index²¹ (CVI) is used to test the validity of both the questionnaires of student and teachers. The content validity test was greater than 0.8 which indicates that the research instrument has a high validity (Rubio et al., 2003). Then, the test is conducted for all the variables separately, and a result appears greater than 0.7 which approves the validity of all the questions within variables.

3.1. Sequence 1: Student Questionnaire

Initially, more than one thousand questionnaires were administered to students enrolled at AUI and Department of English at SMBAU and MIU, yet less than 600 were filled out exhaustively. 20 were discarded because they were not completed properly. A nonprobability convenient sampling is opted for, and the collected data was coded and analysed through the SPSS Version 23. The latter is resorted to since it provides alluring data analysis and data transformation depending on the research objectives. SPSS remains the most statistical software widely used in the field of social sciences (Arkkelin, 2014).

Such a high response rate is so significant that it can legitimize the questionnaire's outcome, which gives more accuracy and credibility to the result. Hence, the high return rate of the questionnaire implies that the sample opted for is likely to represent the overall target population and that the way it was administered was successful. This contributes to ensuring that the questionnaire outcome is representative of the whole population.

²¹ Content Validity is the degree to which an instrument has an appropriate sample of items for the construct being measured and is an important procedure in scale development. Content validity index (CVI) is the most widely used index in quantitative evaluation.

The online questionnaire is divided into four sections. Demography, Awareness, Satisfaction, and Competence in addition to some emerging themes inferred from informants' comments. The sample for this study is composed of Moroccan University students from Sidi Mohamed Ben Abdellah University in Fes (SMBAU), Moulay Ismail University in Meknes (MIU), and Al Akhawayn University in Ifrane (AUI). All the students were enrolled in the 2017-2018 academic year ranging from semester one to six and master. A total number of 580 respondents have filled out the questionnaire exhaustively. Figure 9 and Table 6 (see Chapter three, pages 121 and 122 respectively) provide a detailed description of the demographic characteristics of the sample.

To begin with, Table 5 (see below) displays the reliability for the Web 3.0 and SDL scales used for this research paper. The Cronbach's alpha internal consistency reliability is .779 for all scales (10) and items (60), yet it ranges from 0.610 to 0.792. The scales with a Cronbach's alpha less than .70 is Demography (0.610) which comprises thirteen items. The other scales are above .70; i.e. attitudes (0.792) including 15 items, satisfaction (0.736) encompassing 16 items, and competence (0.787) covering 22 items. These results show that the four scales used in this study have different Cronbach's alpha. As mentioned by Polit and Beck (2012), reliability coefficients above .70 are considered adequate. This means that the scales have high level of consistency, and the questions incorporated in the questionnaire are reliable and coherent.

Table 5 Reliability Statistics of the Questionnaire's Items

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.856	.858	60

3.1.1. Description of Independent Variables: Demographic Attributes

This demographic section includes thirteen items which are divided into five sub-sections describing students' age group, gender, university of affiliation, level of study, device ownership, Internet access, and Internet frequency, and each sub-section gathers into related items. The first sub-section is named 'Demography' and it includes four items (age group, gender, university of affiliation, & level of study). The second sub-section is named 'Device Ownership' and it includes four items (PC ownership, Tablet ownership, Smart Phone ownership, & Smart Watch ownership). The third sub-section is named 'Device BOYD' and it includes one item (Bring Your Own Device). The fourth sub-section is named 'Internet Use' includes two items (the access to the Internet and the place of the Internet). The fifth sub-section is named 'Internet Frequency' and it includes two items (Internet Frequency per day and Internet Use in class per week).

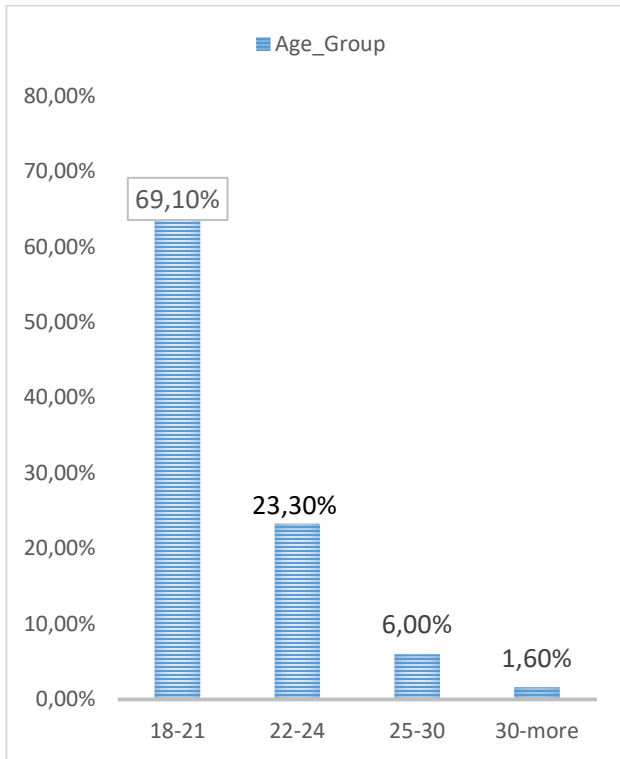
3.1.1.1. Distribution of Age, Gender, Institution, & Study Level

Generally speaking, the sample size of the respondents to the questionnaire is N 580. This first sub-section 'Demography' includes four items collecting the sample's age group, gender, university of affiliation, and study level. The description of these items appears in Table 6 and Figure 9 (see below). Figure 9 stands for a dashboard which comprises the first four items of the demographic section that are age group (a), gender (b), university of affiliation (c), and level of study (d).

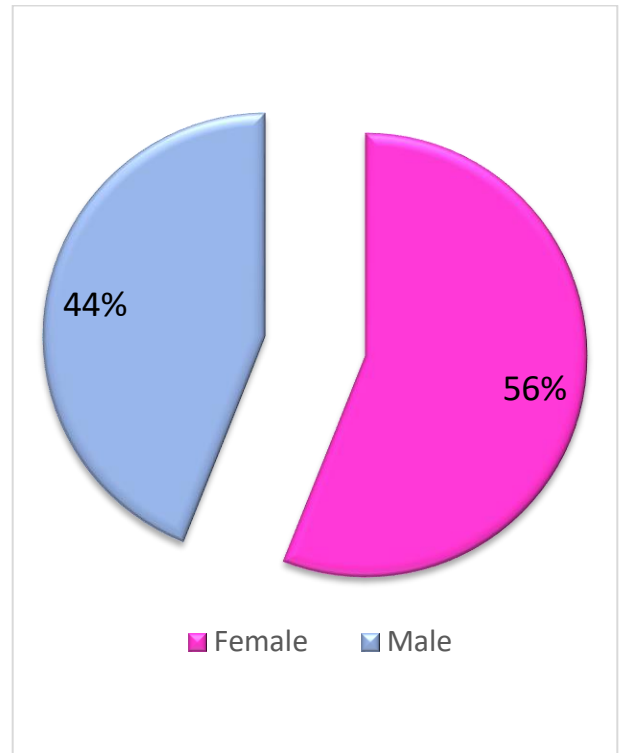
As to gender distribution (please indicate your gender), the first table of frequency and figure show that overall of the 580 subjects of the study that are used 56% ($n = 325$) students who are females and 44% ($n = 255$) males, a slight equal gender distribution between females and males (see Table 6 & Figure 9 below).

For age group distribution (please indicate your age category), it can also be viewed that the range of students' age is between 18 and more than 30, whereas the vast majority of the students (92.40%) are between 18 and 24 N536 (cumulative age group of 69.1% 18-21 & 23.3% of 22-24); 6.2% between 25 & 29 years; while only 2.2% aged more than 30 years old. As to the level of study, the sample contains more sophomore (second year) students (41% = N238) followed by freshman (first year) students (22.8% = N132) and then 15.7% = N91 senior (third year), and master students (9.3% = N54).

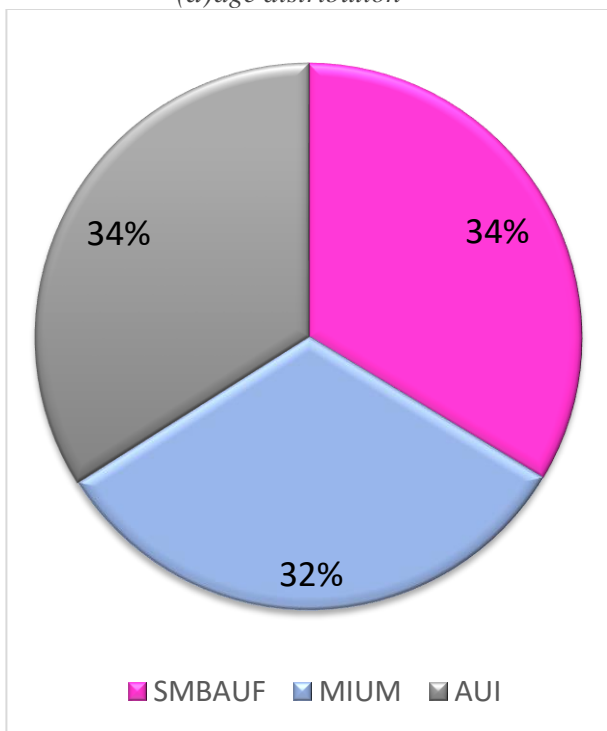
Figure 9 Demographic Dashboard of the respondents: (a) gender, (b) age, (c) university, & (d) level



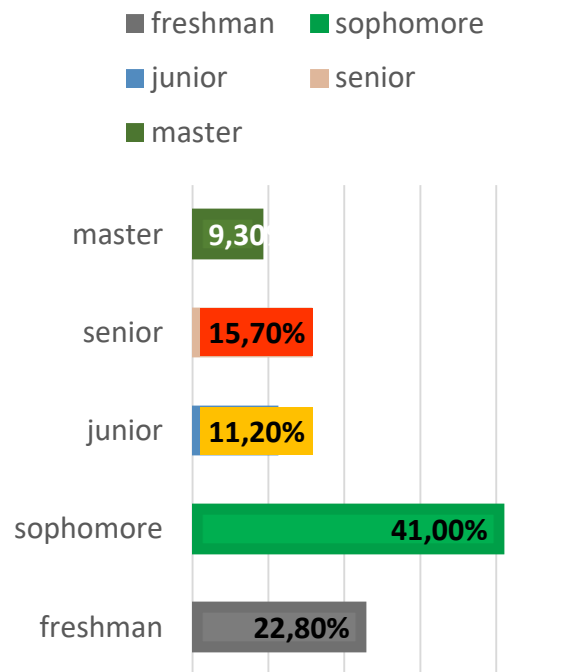
(a) age distribution



(b) gender distribution



(c) Institution Distribution



(d) Study Level Distribution

Concerning the type of institution (please select your university), Table 6 (below) and Figure 9 (above) reveals an almost equal institution distribution among the three universities. 33.6% = N195 indicate that their university of affiliation is SMBAF, 32.4% = N188 indicate that their university of affiliation is MIU, while 34.0% = N197 indicate AUI as their university of affiliation.

Regarding the item of study level (please select your current semester), data collected report for Freshman (n = 132; 22.8%); Sophomore (n = 238; 41%); Junior (n = 65; 11.2%); Senior (n = 91; 15.7%); Master (n = 54; 9.3%) indicating the highest mode is gained by the young learners (see Table 6 below and Figure 9 above).

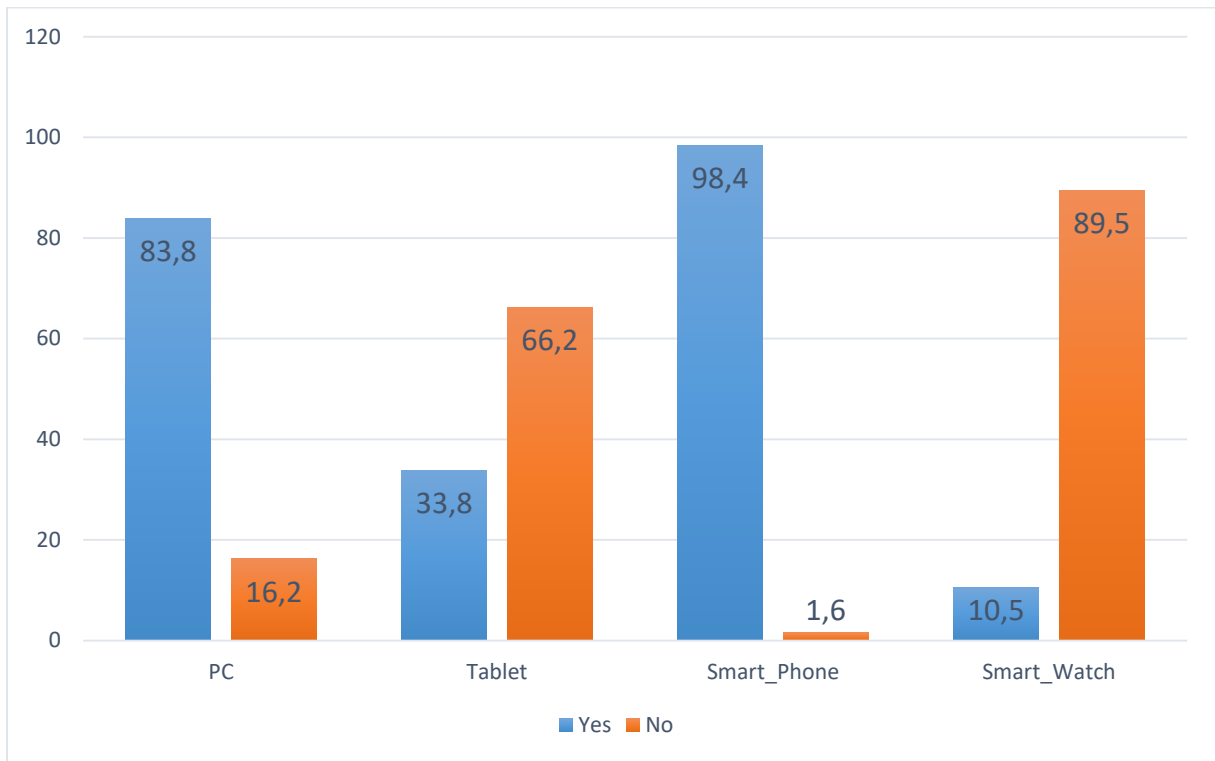
Table 6 Percentage data of demographic variables (age, gender, university, level)

Age group	N	Gender	N	University	N	Semester	N
18-21	401 (69,1%)	Female	325 (56,0%)	SMBAU	195 (33,6%)	freshman	132 (22,8%)
22-24	135 (23,3%)	Male	255 (44,0%)	MIU	188 (32,4%)	sophomore	238 (41,0%)
25-29	35 (6,0%)			AUI	197 (34,0%)	junior	65 (11,2%)
30-More	9 (1,6%)					senior	91 (15,7%)
						master	54 (9,3%)
Total	580		580		580		580

3.1.1.2. Device Ownership

The main objective of this study is to infer data about the use and impact of device ownership and frequency as equipment in the different universities and students' SDL. It is supposed that the type of institution is significantly linked to the use and usage of Web 3.0 Apps.

Figure 10 Percentage of Respondents' Mobile Device Ownership



As to the technological device ownership and use, students respond on the type of technology device they own, and they use during their study (do you own the following mobile device?). Figure 10 above reveals that almost all students (98.4% = N571) own a smart phone, the vast majority of students have their own Personal Computer 83.8% = N486), more than a third (33.8% = N196) have a Tablet, and an important number of the respondents possess a smart watch (10.5% = N61) (see also Table 7 below).

Table 7 Percentages of the respondents' device ownership

		PC	Tablet	Smart Phone	Smart Watch
Valid	Yes	486 (83,8%)	196 (33,8%)	571 (98,4)	61 (10,5%)
	No	94 (16,2)	384 (66,2%)	9 (1,6%)	519 (89,5%)
Total		580	580	580	580

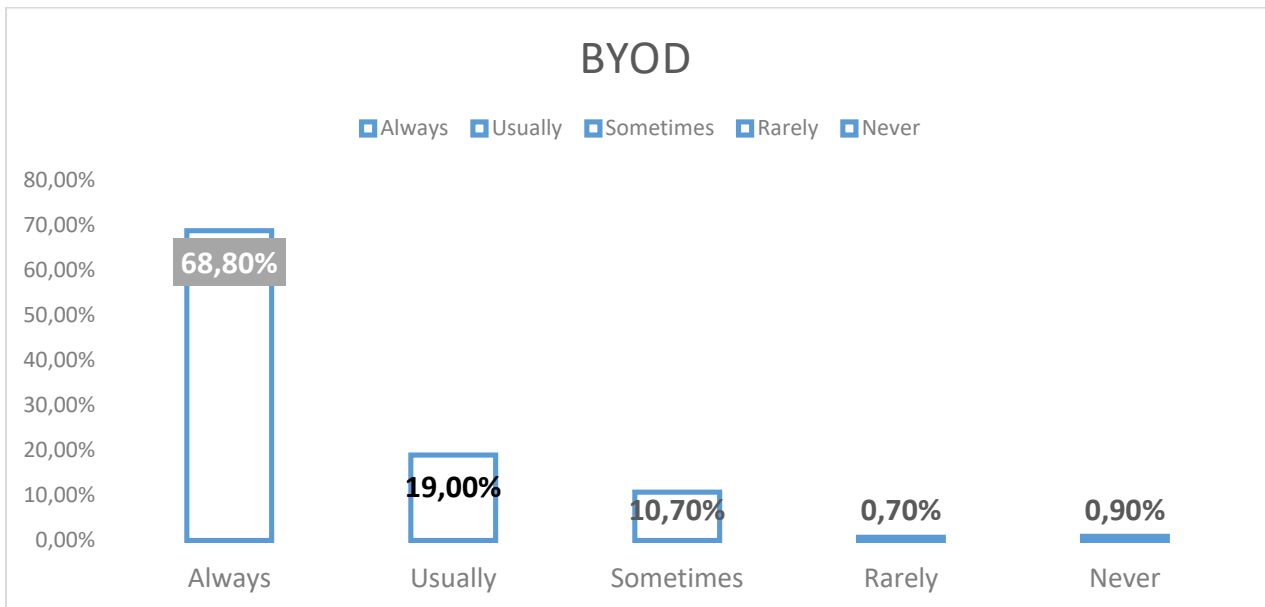
Reacting to the question, “How often do you bring your own device BYOD²² to school?”, Table 8 and Figure 11 (see below) show that more than a half of the respondents (68.8% = N399) report to have ‘always’ brought their own device; 19% (N110) have ‘usually’ brought their own device; 10.7% (N62) have sometimes held their technological device; 0.7% (N4) have ‘rarely’ taken their device; and only 0.9% (N5) of the respondents who have never carried their mobile device with them while attending their courses.

Table 8 Frequency of bringing device to school

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid never	5	,9	,9	,9
Rarely	4	,7	,7	1,6
sometimes	62	10,7	10,7	12,2
usually	110	19,0	19,0	31,2
always	399	68,8	68,8	100,0
Total	580	100,0	100,0	

²² BYOD means Brings Your Own Device

Figure 11 frequency of bring device to school



3.1.1.3. Internet Frequency Distribution

Concerning the Internet connection (see Figure 12 below), a vast majority of the respondents (91% = N528) report to have access to the Internet, while 9% (N52) claim not to have Internet facility (see table 9). Within the same framework, Table 10 displays that a small number (10.9% = N63) of the respondents report to have access to the Internet everywhere (home, school, library, café, cyber, mobile), 21.6% (N125) report to have Internet access in at least five places (such as mobile phone, home, café, cyber), 16.4% (N95) report to have Internet in at least four places, 18.3% (N106) report to have Internet in at least three places, 17.4% (N101) report to have Internet access in at least two places, while 15.5% (N90) indicate to have Internet at least in one area.

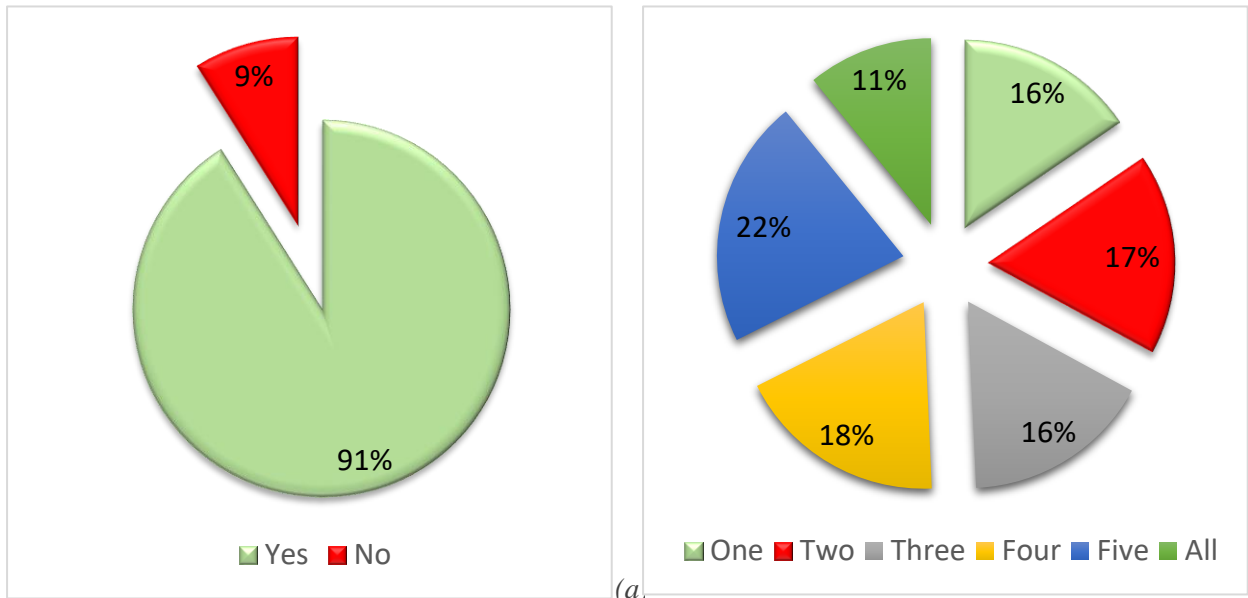
Table 9 percentage of respondents' Internet Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	528	91,0	91,0	91,0
	No	52	9,0	9,0	100,0
	Total	580	100,0	100,0	

Table 10 percentage of respondents' Internet place of use

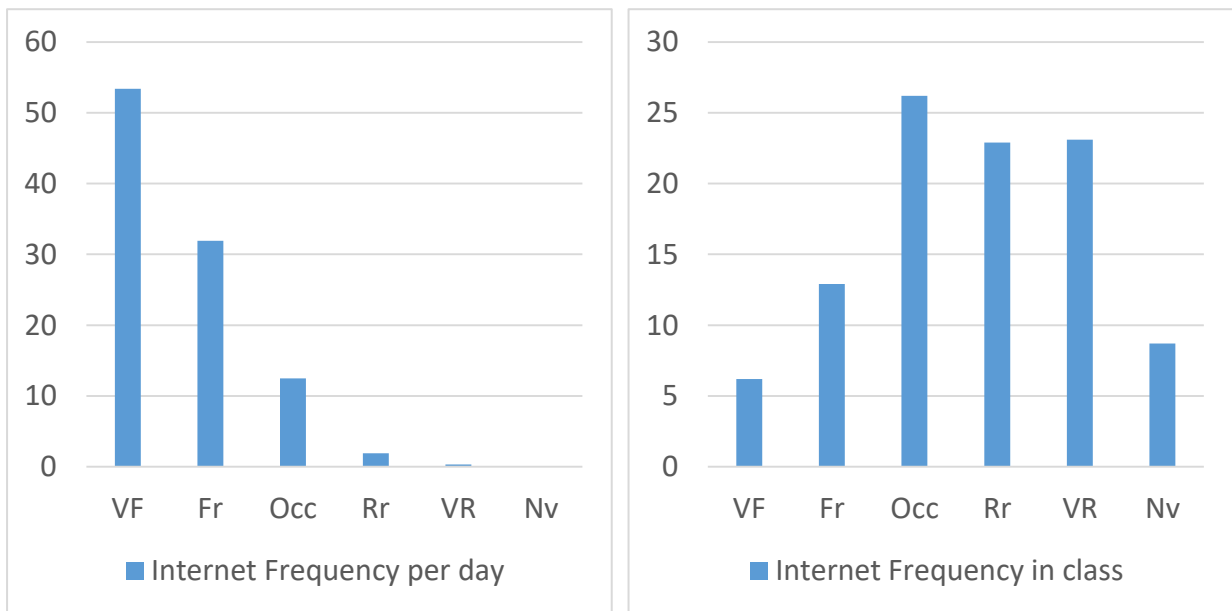
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Everywhere	63	10,9	10,9	10,9
	five places	125	21,6	21,6	32,4
	four places	95	16,4	16,4	48,8
	three places	106	18,3	18,3	67,1
	two places	101	17,4	17,4	84,5
	one place	90	15,5	15,5	100,0
	Total	580	100,0	100,0	

Figure 12 Percentage Dashboard of Internet Use and frequency



Internet Access

(b) Places of Internet



(c) Internet frequency per day

(d) Internet frequency in class

VF stands for “Very Frequently”; Fr stands for “Frequently”; Occ stands for “Occasionally”; Rr stands for “Rarely”; VR stands for “Very Rarely”; Nv stands for “Never”.

As to the Internet frequency per day (how frequently do you use Internet per day?), more than a half of the respondents (53.4% = N310) report to ‘very frequently’ and a third of them ‘frequently (31.9% =N185) use the Internet on a daily basis while 12.4% (N72) indicate

to use the Internet occasionally per day. However, the respondents' reaction to Internet frequency during study (how often do you use Internet in class?) they 'very rarely' (23.1%) and rarely (22.9%) use the Internet inside their classrooms, yet only 8.6% of the participants use the Internet 'very frequently' in classrooms (see tables 11 & 12).

Table 11 Percentage of the respondents' Internet frequency per day

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	very frequently	310	53,4	53,4	53,4
	frequently	185	31,9	31,9	85,3
	occasionally	72	12,5	12,5	97,8
	rarely	11	1,9	1,9	99,7
	never	2	,3	,3	100,0
	Total	580	100,0	100,0	

Table 12 Percentage of the respondents' Internet frequency in class

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	very frequently	36	6,2	6,2	6,2
	frequently	75	12,9	12,9	19,1
	occasionally	152	26,2	26,2	45,3
	rarely	133	22,9	22,9	68,3
	very rarely	134	23,1	23,1	91,4
	never	50	8,7	8,7	100,0
	Total	580	100,0	100,0	

3.1.1. Description of Responses

3.1.1.1. Response about Awareness of Web 3.0

This section illustrates through the use of graphics and tables the percentage distribution for the question whether students have accounts in and are familiar with one or more Web 3.0 technologies. It is lucid that students are very much familiar with the four most known platforms Facebook, WhatsApp, GoogleDocs, and YouTube and less familiar with the other useful platforms such as BookWidget, Coursera, Edmodo, Edublogs, Kahoot, and Webinar

Figure 13 Students' Accounts in Web 3.0 Technologies

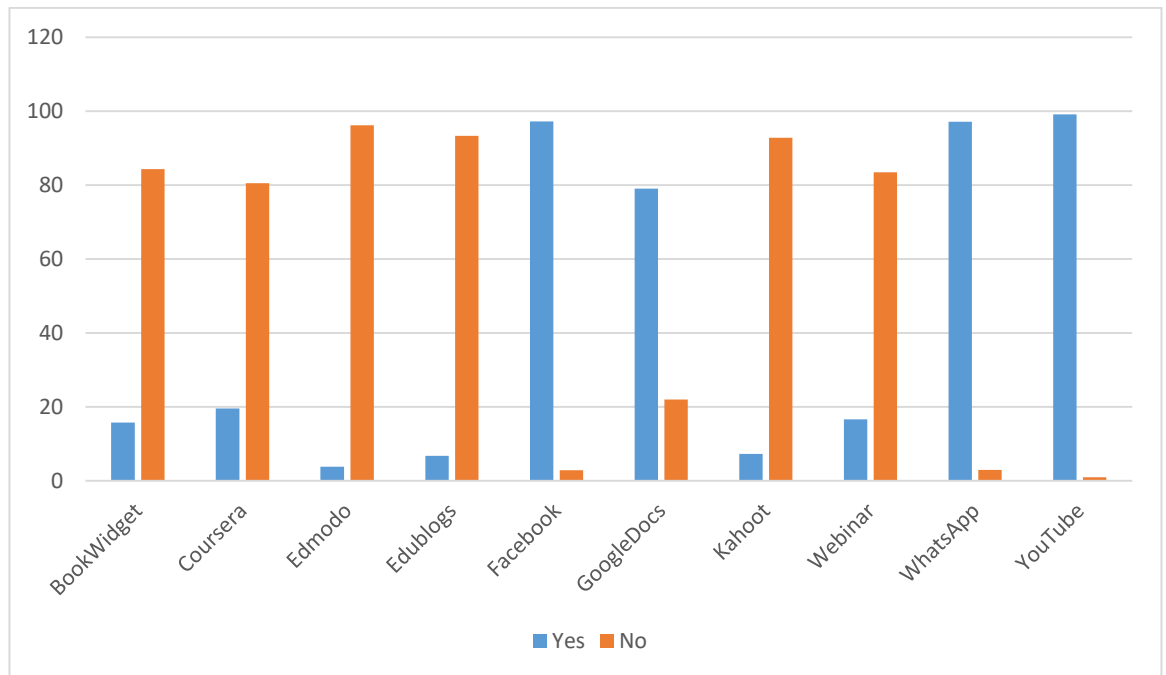


Figure 13 (above) and Table 13 (below) display that Facebook, WhatsApp and YouTube outperform the other Web 3.0 technologies in the accounts and familiarity among students. To put it differently, a great number of the respondents state they do not have an account in BookWidget (84.3%), Coursera (80.5%), and Webinar (83.8%); a vast majority do not have an account in Edmodo (96.2%), Edublogs (93.3%), and Kahoot (92.8%). However,

a vast majority of the respondents indicate to have an account in Facebook (97.2%), WhatsApp (97.1%) and YouTube (99.1%). Last, a great number of the respondents state they have an account in GoogleDocs (79%).

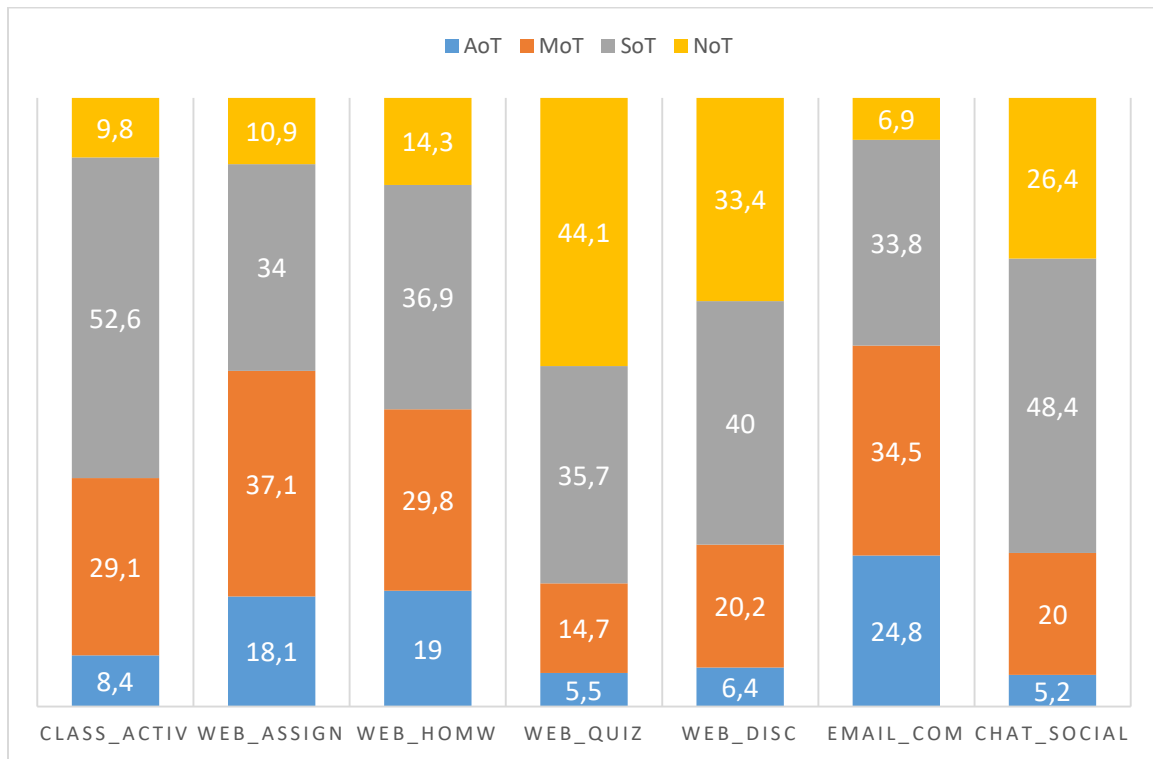
Table 13 Percentage of students' awareness of Web 3.0 Apps

<i>Valid</i>	<i>Yes</i>		<i>No</i>	
	<i>Frequency</i>	<i>Percentage</i>	<i>Frequency</i>	<i>Percentage</i>
<i>BookWidget</i>	91	15,7	489	84,3
<i>Coursera</i>	113	19,5	467	80,5
<i>Edmodo</i>	22	3,8	558	96,2
<i>Edublog</i>	39	6,7	541	93,3
<i>Facebook</i>	564	97,2	16	2,8
<i>GoogleDocs</i>	458	79,0	122	21,0
<i>Kahoot</i>	42	7,2	538	92,8
<i>Webinar</i>	96	16,6	484	83,4
<i>WhatsApp</i>	563	97,1	17	2,9
<i>YouTube</i>	575	99,1	5	,9

3.1.1.2. Response about use of Web 3.0

Given the highly signaled educational potential of some Web 3.0 Apps, students were asked to report the ways in which their instructors use such Apps either inside or outside class. More specifically, they were invited to point if all, most, some, or none of their teachers are currently using Web 3.0 applications for learning, creating classroom activities, assigning homework and quizzes, and/or interacting.

Figure 14 Percentage histogram of teachers' use of Web 3.0 with their students



AoT stands for all of them, MoT stands for most of them, SoT stands for some of them, NoT stands for none of them

Hence, teachers' use of Web 3.0 software with their students is demonstrated through Figure 14 (see above) and Tables 14 through 21 show that many teachers communicate with their students online, but very few of them put any homework or assignment online. A total of 305 (52%) of the respondents indicate that some of the teachers incorporate Web 3.0 within class activities; a third of the participants state that some teachers put online assignments (34%) and online homework (36.9%); about half of the respondents claim none of their teacher have ever put any online exam (44.1%). More than a third of the informants assume that some of their teachers discuss online with students (40%), send their students emails (33.8%), and chat with them through social Web 3.0 platforms (48.4%).

Table 14 Percentage of teachers' inclusion of Web 3.0 in classroom activities

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid all of them	49	8,4	8,4	8,4
most of them	169	29,1	29,1	37,6
some of them	305	52,6	52,6	90,2
none of them	57	9,8	9,8	100,0
Total	580	100,0	100,0	

Table 15 Percentage of teachers' inclusion of Web 3.0 task assignment

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid all of them	105	18,1	18,1	18,1
most of them	215	37,1	37,1	55,2
some of them	197	34,0	34,0	89,1
none of them	63	10,9	10,9	100,0
Total	580	100,0	100,0	

Table 16 Percentage of teachers' inclusion of Web 3.0 homework

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid all of them	110	19,0	19,0	19,0
most of them	173	29,8	29,8	48,8
some of them	214	36,9	36,9	85,7
none of them	83	14,3	14,3	100,0
Total	580	100,0	100,0	

Table 17 Percentage of teachers' inclusion of Web 3.0 quizzes & exams

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	all of them	32	5,5	5,5	5,5
	most of them	85	14,7	14,7	20,2
	some of them	207	35,7	35,7	55,9
	none of them	256	44,1	44,1	100,0
	Total	580	100,0	100,0	

Table 18 Percentage of teachers' inclusion of Web 3.0 discussion with students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	all of them	37	6,4	6,4	6,4
	most of them	117	20,2	20,2	26,6
	some of them	232	40,0	40,0	66,6
	none of them	194	33,4	33,4	100,0
	Total	580	100,0	100,0	

Table 19 Percentage of teachers' inclusion of Web 3.0 in email communication

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	all of them	144	24,8	24,8	24,8
	most of them	200	34,5	34,5	59,3
	some of them	196	33,8	33,8	93,1
	none of them	40	6,9	6,9	100,0
	Total	580	100,0	100,0	

Table 20 Percentage of teachers' inclusion of Web 3.0 in chatting with students

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid all of them	30	5,2	5,2	5,2
most of them	116	20,0	20,0	25,2
some of them	281	48,4	48,4	73,6
none of them	153	26,4	26,4	100,0
Total	580	100,0	100,0	

Table 21 Percentage of teachers' use of Web 3.0 in chatting with students

	Frequency	Percent	Valid Percent	Cumulative Percent
All	38	6,6	6,6	6,6
Most	127	21,9	21,9	28,4
Valid None	118	20,3	20,3	48,8
Some	297	51,2	51,2	100,0
Total	580	100,0	100,0	

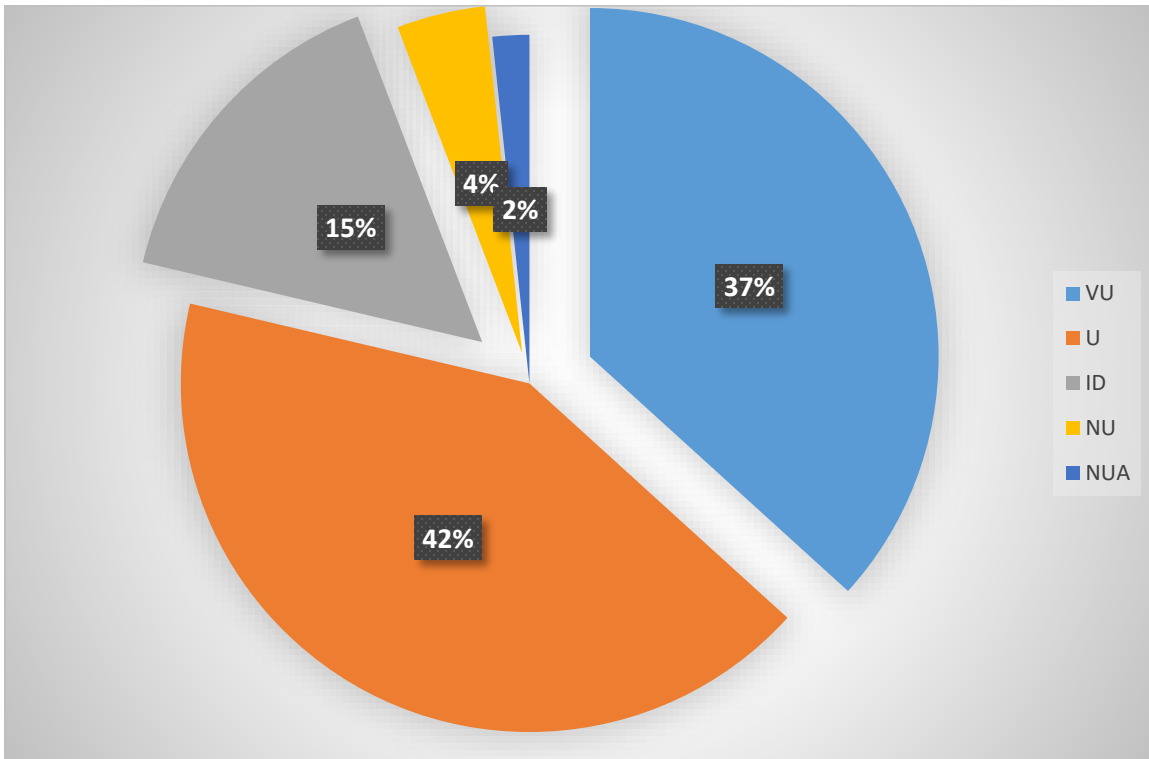
Table 22 Percentage table of students' attitudes to the usefulness of Web 3.0

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	very useful	213	36,7	36,7	36,7
	Useful	243	41,9	41,9	78,6
	Indifferent	90	15,5	15,5	94,1
	not useful	24	4,1	4,1	98,3
	not useful at all	10	1,7	1,7	100,0
	Total	580	100,0	100,0	

Regarding students' perceptions of pedagogical usefulness of Web 3.0 Applications, Figure 15 (below) and Table 22 (above) show in detail that a great number (78.6% = N456) of the respondents take the side of the usefulness of Web 3.0 (36.7% very useful & 41.9% useful). A tiny number (5.8% = N34) believe that Web 3.0 is with no usefulness (4.1% not useful & 1.7% not useful at all). Last, 90 respondents prefer to remain indifferent as to the usefulness of Web 3.0 (15.5%).

However, an equal distribution between respondents who indicate that Web 3.0 may substitute face-to-face and others who think that face-to-face will sustain (see Table 23 and Figure 16). 13.8% =N80 strongly agree, 25.7% =N149 agree, 22.2% =N129 disagree, and 11.4% =N66 strongly disagree that Web 3.0 will replace face-to-face as a way of learning methods. Last, an important number remains neutral (26.9% =N156).

Figure 15 Percentage of students' attitudes to the usefulness of Web 3.0

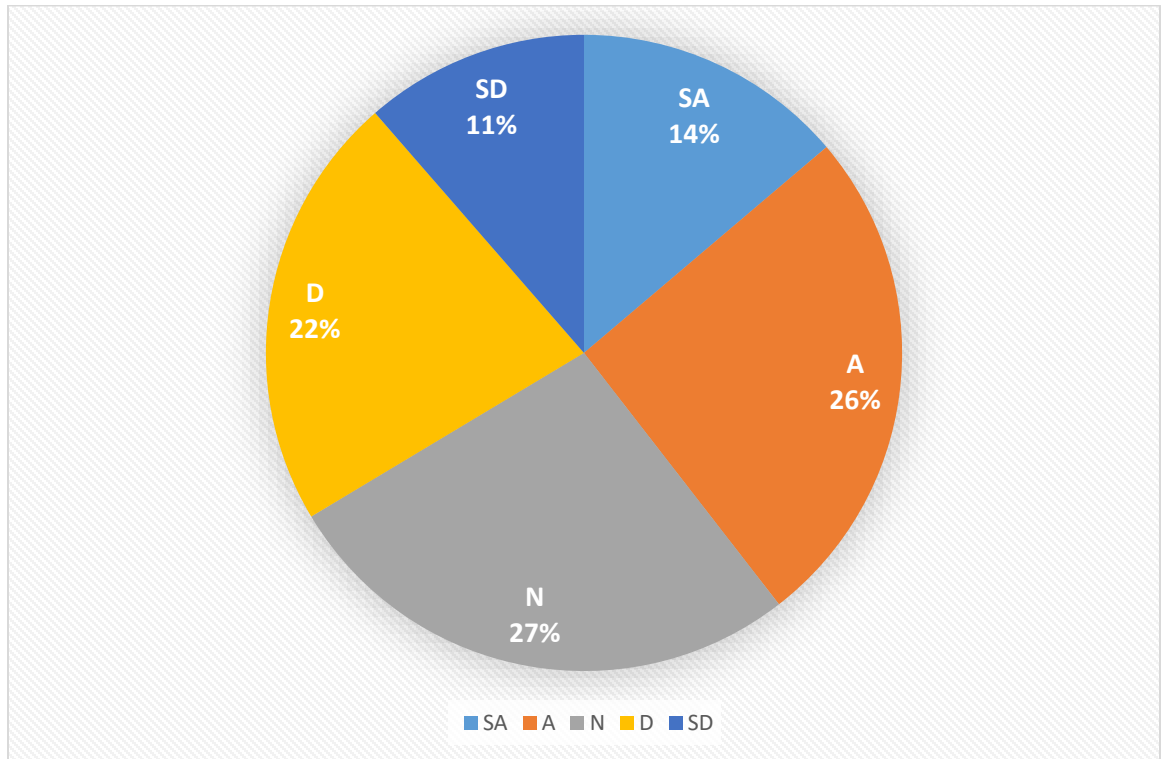


VU stands for Very Useful, U stands for Useful, ID stands for Indifferent, NU stands for Not Useful, NUA stands for Not Useful At All

Table 23 Percentage of students who think Web 3.0 will substitute face-to-face learning

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly agree	80	13,8	13,8	13,8
Agree	149	25,7	25,7	39,5
Neutral	156	26,9	26,9	66,4
Disagree	129	22,2	22,2	88,6
strongly disagree	66	11,4	11,4	100,0
Total	580	100,0	100,0	

Figure 16 Percentage of students' opinion to the substitution of Web 3.0 to face-to-face



SD stands for Strongly Disagree, D stands for Disagree, N stands Neutral, A stands for Agree, SA stands for Strongly Agree

3.1.1.3. Response about satisfaction with Web 3.0

As an answer to Research Question 2, the Likert-scale questions provide a wealth of information related to students' satisfaction with the contribution of Web 3.0 Apps in the enhancement of elements of their SDL. The rating scale range uses '1' to indicate strong agreement and '5' to indicate strong disagreement. The overall descriptive data for students' responses is displayed in Figure 9 (see page 121), and the detailed descriptive data for each SDL element is exhibited throughout the subsequent tables.

Students were asked to rate their overall satisfaction with the enhancement of their SDL elements thanks to the use of Web 3.0 applications. Figure 17 and Tables 24 through 35 provide detailed statistics of respondents' Likert scales answers to the twelve items of satisfaction. Thus, a majority of students agree that Web 3.0 technologies have contributed to

improving many of their SDL components such as taking initiative, setting goals, and getting motivated.

Generally, among the average of the respondents, 37.6% scored item (1), “Web 3.0 helps me to manage my time” as agree, 53.1% scored item (2), “Web 3.0 helps me get more motivated” as agree, 41% scored item (3), “Web 3.0 helps me to be well organized” as agree, 48% scored item (4), “Web 3.0 helps me to learn quickly and easily” as agree, 37.1% scored item (5), “Web 3.0 helps me prioritize my tasks” as agree, 48.1% scored item (6), “Web 3.0 helps me to set academic goals” as agree, 49.8% scored item (7), “Web 3.0 helps me to gain confidence” as agree, 56.2% scored item (8), “Web 3.0 helps me to enjoy learning” as agree, 37.4% scored item (9), “Web 3.0 helps me to feel more responsible” as agree, 41.4% scored item (10), “Web 3.0 helps me to take initiative in learning” as agree, 44% scored item (11), “Web 3.0 helps me to participate in class activities” as agree, 37.6% scored item (12), “Web 3.0 helps me to prepare well for my exams” as agree. Over all, for every item, at least 37% of the respondents agreed.

Table 24 percentage of respondents' Web 3.0 satisfaction with time management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	78	13,4	13,4	13,4
	Agree	218	37,6	37,6	51,0
	Neutral	128	22,1	22,1	73,1
	Disagree	129	22,2	22,2	95,3
	strongly disagree	27	4,7	4,7	100,0
	Total	580	100,0	100,0	

Table 25 percentage of respondents' Web 3.0 satisfaction with motivation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	99	17,1	17,1	17,1
	Agree	308	53,1	53,1	70,2
	Neutral	115	19,8	19,8	90,0
	Disagree	49	8,4	8,4	98,4
	strongly disagree	9	1,6	1,6	100,0
	Total	580	100,0	100,0	

Table 26 percentage of respondents' Web 3.0 satisfaction with organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	86	14,8	14,8	14,8
	Agree	238	41,0	41,0	55,9
	Neutral	125	21,6	21,6	77,4
	Disagree	111	19,1	19,1	96,6
	strongly disagree	20	3,4	3,4	100,0
	Total	580	100,0	100,0	

Table 27 percentage of respondents' Web 3.0 satisfaction with easy learning

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly agree	209	36,0	36,0	36,0
Agree	282	48,6	48,6	84,7
Neutral	71	12,2	12,2	96,9
Disagree	11	1,9	1,9	98,8
strongly disagree	7	1,2	1,2	100,0
Total	580	100,0	100,0	

To put it differently, half of the respondents (51%) assume they could manage their time thanks to the use of Web 3.0 Technologies (13.4% strongly agree & 37.6% agree). A great number of the respondents (70.2%) believe that Web 3.0 help them get motivated (17.1% strongly agree & 53.1% agree). More than half of the subjects (55.8%) indicate that they become organized thanks to Web 3.0 (14.8% strongly agree & 41% agree).

Table 28 percentage of respondents' Web 3.0 satisfaction with prioritizing

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly agree	82	14,1	14,1	14,1
Agree	215	37,1	37,1	51,2
Neutral	146	25,2	25,2	76,4
Disagree	119	20,5	20,5	96,9
strongly disagree	18	3,1	3,1	100,0
Total	580	100,0	100,0	

Table 29 percentage of respondents' Web 3.0 satisfaction with goal setting

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly agree	88	15,2	15,2	15,2
Agree	279	48,1	48,1	63,3
Neutral	119	20,5	20,5	83,8
Disagree	82	14,1	14,1	97,9
strongly disagree	12	2,1	2,1	100,0
Total	580	100,0	100,0	

A majority of the informants (84.6%) report to learn easily and quickly while using Web 3.0 (36% strongly agree & 48.6% agree. Half of the informants (51.2%) report to set priorities concerning different tasks since they started using Web 3.0 (14.1% strongly agree & and 37.1% agree). Over half of the participants (63.3%) accept that Web 3.0 help them set their goals (strongly agree (15.2%) and agree (48.1%).

Table 30 percentage of respondents' Web 3.0 satisfaction with confidence

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly agree	103	17,8	17,8	17,8
Agree	289	49,8	49,8	67,6
Neutral	124	21,4	21,4	89,0
Disagree	52	9,0	9,0	97,9
strongly disagree	12	2,1	2,1	100,0
Total	580	100,0	100,0	

Table 31 percentage of respondents' Web 3.0 satisfaction with learning enjoyment

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly agree	143	24,7	24,7	24,7
agree	326	56,2	56,2	80,9
neutral	71	12,2	12,2	93,1
disagree	32	5,5	5,5	98,6
strongly disagree	8	1,4	1,4	100,0
Total	580	100,0	100,0	

An important number of the respondents (67.6%) assume that Web 3.0 helps them feel more confident (17.8% strongly agree & 49.8% agree). 80.9% of the respondents indicate they enjoy learning while using Web 3.0 technologies (24.7% strongly agree & 56.2% agree). About half of the respondents (48.1%) believe they become more responsible after using Web 3.0 (10.7% strongly agree & 37.4% agree).

Table 32 percentage of respondents' Web 3.0 satisfaction with responsibility

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly agree	62	10,7	10,7	10,7
agree	217	37,4	37,4	48,1
neutral	186	32,1	32,1	80,2
disagree	101	17,4	17,4	97,6
strongly disagree	14	2,4	2,4	100,0
Total	580	100,0	100,0	

Again, more than a half of the respondents 58.8% indicate that Web 3.0 help them to take initiative in the learning process (17.4% strongly agree 41.4% agree). A majority of the

respondents (72.1%) assume that Web 3.0 help them to participate more in the classroom activities (28.1% strongly agree & 44% agree). Last, a percentage of 72.4% of the participants indicate that Web 3.0 help them to prepare for their exams (34.8 strongly agree & 37.6 agree).

Table 33 percentage of respondents' Web 3.0 satisfaction with taking initiative

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly agree	101	17,4	17,4	17,4
agree	240	41,4	41,4	58,8
neutral	181	31,2	31,2	90,0
disagree	40	6,9	6,9	96,9
strongly disagree	18	3,1	3,1	100,0
Total	580	100,0	100,0	

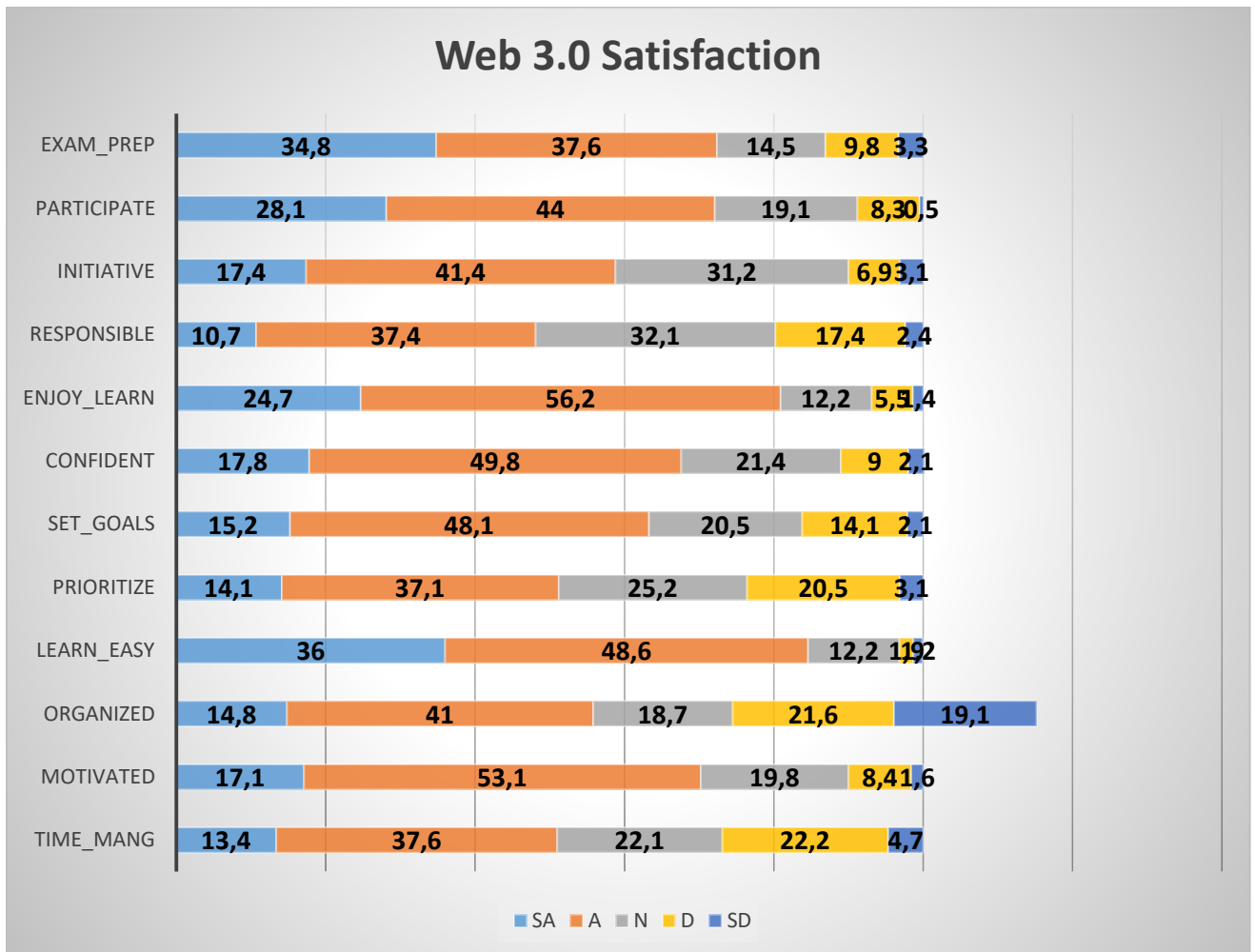
Table 34 percentage of respondents' Web 3.0 satisfaction with participation

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly agree	163	28,1	28,1	28,1
agree	255	44,0	44,0	72,1
neutral	111	19,1	19,1	91,2
disagree	48	8,3	8,3	99,5
strongly disagree	3	,5	,5	100,0
Total	580	100,0	100,0	

Table 35 percentage of respondents' Web 3.0 satisfaction with exam preparation

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly agree	202	34,8	34,8	34,8
agree	218	37,6	37,6	72,4
neutral	84	14,5	14,5	86,9
disagree	57	9,8	9,8	96,7
strongly disagree	19	3,3	3,3	100,0
Total	580	100,0	100,0	

Figure 17 Percentage histogram of students' SDL satisfaction with Web 3.0 Apps



SD stands for Strongly Disagree, D stands for Disagree, N stands Neutral, A stands for Agree, SA stands for Strongly Agree

All the twelve items of SDL satisfaction were gathered, coded and scored under one construct and produced the following data. Tables 24 through 36 demonstrate that a vast majority of the respondents (86% = N502) are highly satisfied (48.1% = N279) and satisfied (38% = N223) when it comes to the enhancement of their SDL components through the incorporation of Web 3.0 technologies in their learning process.

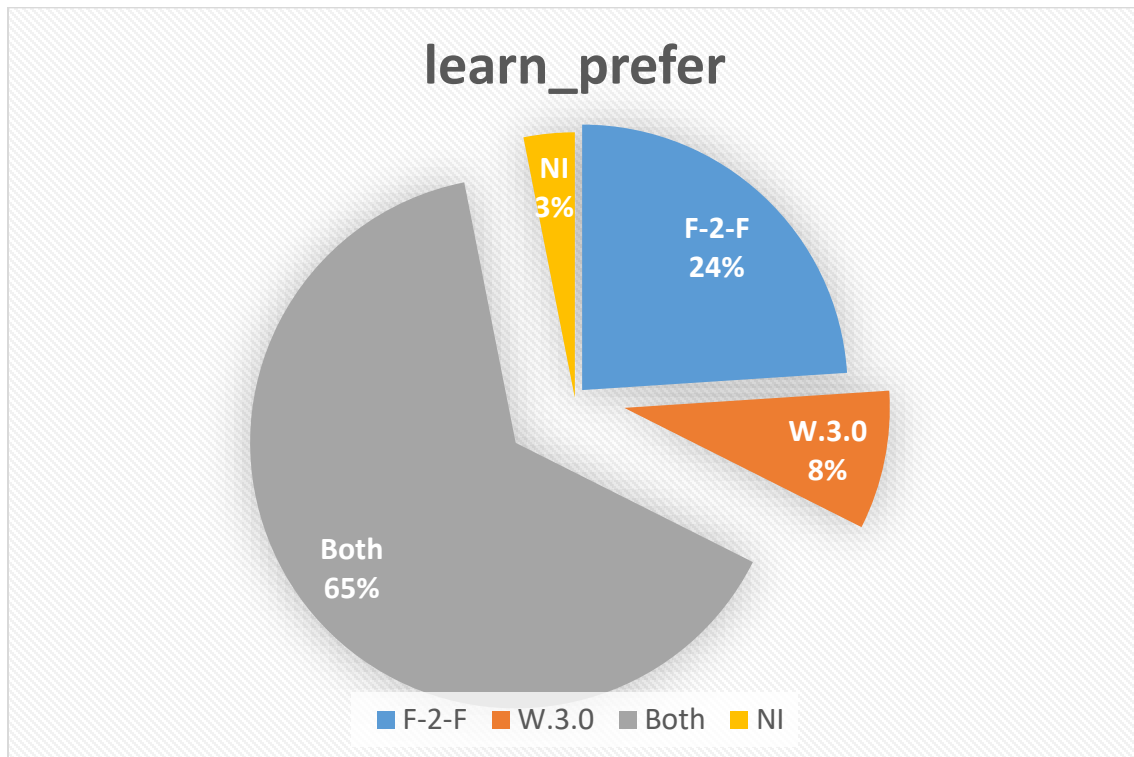
Overall, university students confirm to have a higher satisfaction for the inclusion of Web 3.0 Applications in their learning process, which contributes to enhancing their SDL as

an element of ILOs. Of the sample under study, 38% report to be highly satisfied with the role of Web 3.0 in their SDL empowerment, while only 1% of the respondents indicate a low satisfaction within the same framework (see Table 36).

Table 36 percentage of students' SDL satisfaction via Web 3.0

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AVERAGE	72	12,4	12,4	12,4
	HIGHER	279	48,1	48,1	60,5
	LOW	6	1,0	1,0	61,6
	SATISFIED	223	38,4	38,4	100,0
	Total	580	100,0	100,0	

Figure 18 Percentage pie of students' learning style preferences



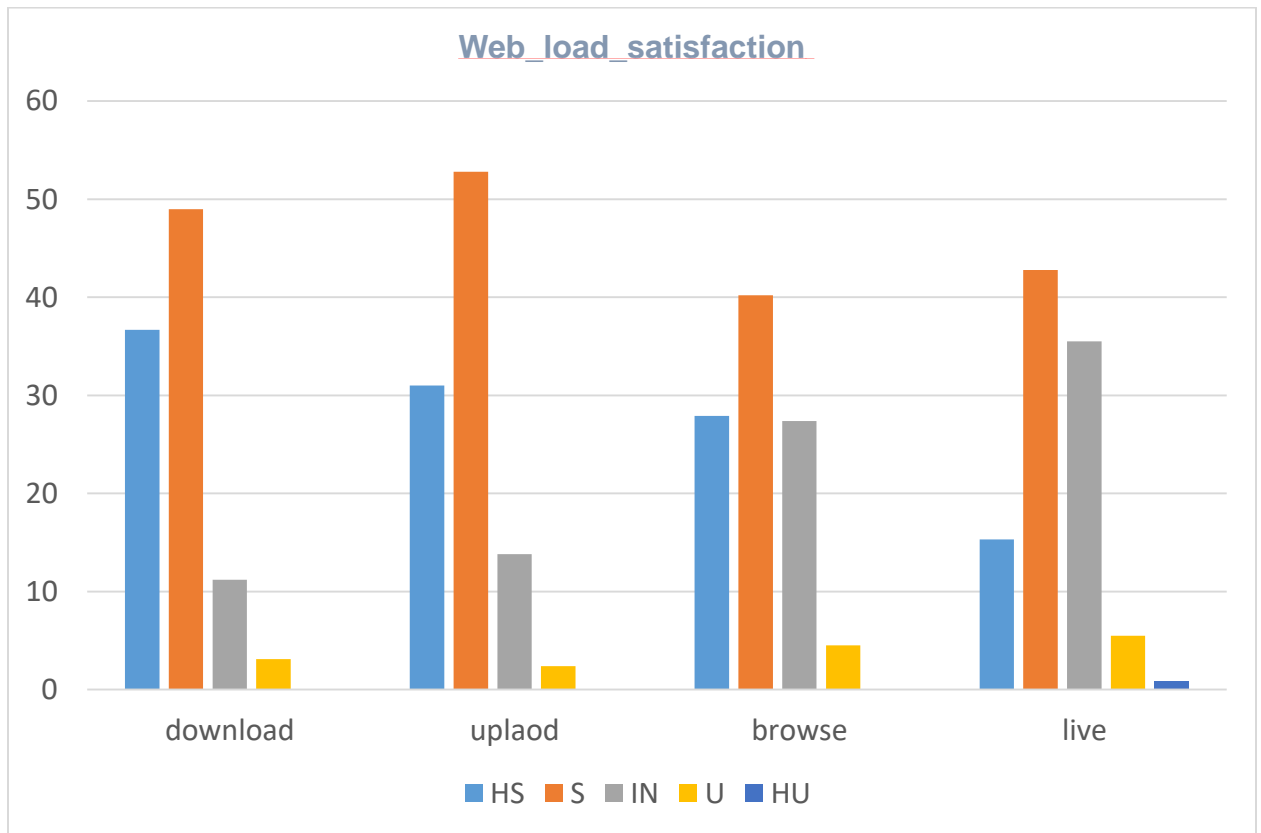
F-2-F stands for Face-to-Face, W.3.0 stands for Web 3.0, Both stands for Both online and face to face, NI stands for Not Interested

As to the learning styles preferences, Table 37 and Figure 18 display that more than half of the respondents prefer to be taught both face-to-face and online (Both 64.5%= N374), only 24% (N137) prefer face-to-face instruction, and a low number (8.4%=N49) who prefer the online learning (Web 3.0). Last, 3.1% (N18) of the respondent remain neutral (or they do not have any idea) about their learning style preference.

Table 37 Percentage of students' learning style preferences

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid face-to-face	139	24,0	24,0	24,0
online	49	8,4	8,4	32,4
both	374	64,5	64,5	96,9
neutral	18	3,1	3,1	100,0
Total	580	100,0	100,0	

Figure 19 Students' Satisfaction with Web 3.0 & Load



HS stands for Highly Satisfied, S stands for Satisfied, IN stands Indifferent, U stands for Unsatisfied, HU stands for Highly Unsatisfied

Referring specifically to the overall satisfaction of the respondents concerning Web 3.0 while downloading and uploading, most respondents assign themselves as highly satisfied (HS 36.7% (N213) and satisfied (S 49% =N284) with Web 3.0 download; highly satisfied (HS 31% (N180) and satisfied (S 52.8% =N306) with Web 3.0 upload; highly satisfied (HS 27.9% (N162) and satisfied (S 40.2% =N233) with Web 3.0 browse; highly satisfied (HS 15.3% (N89) and satisfied (S 42.8% =N242) with Web 3.0 live.

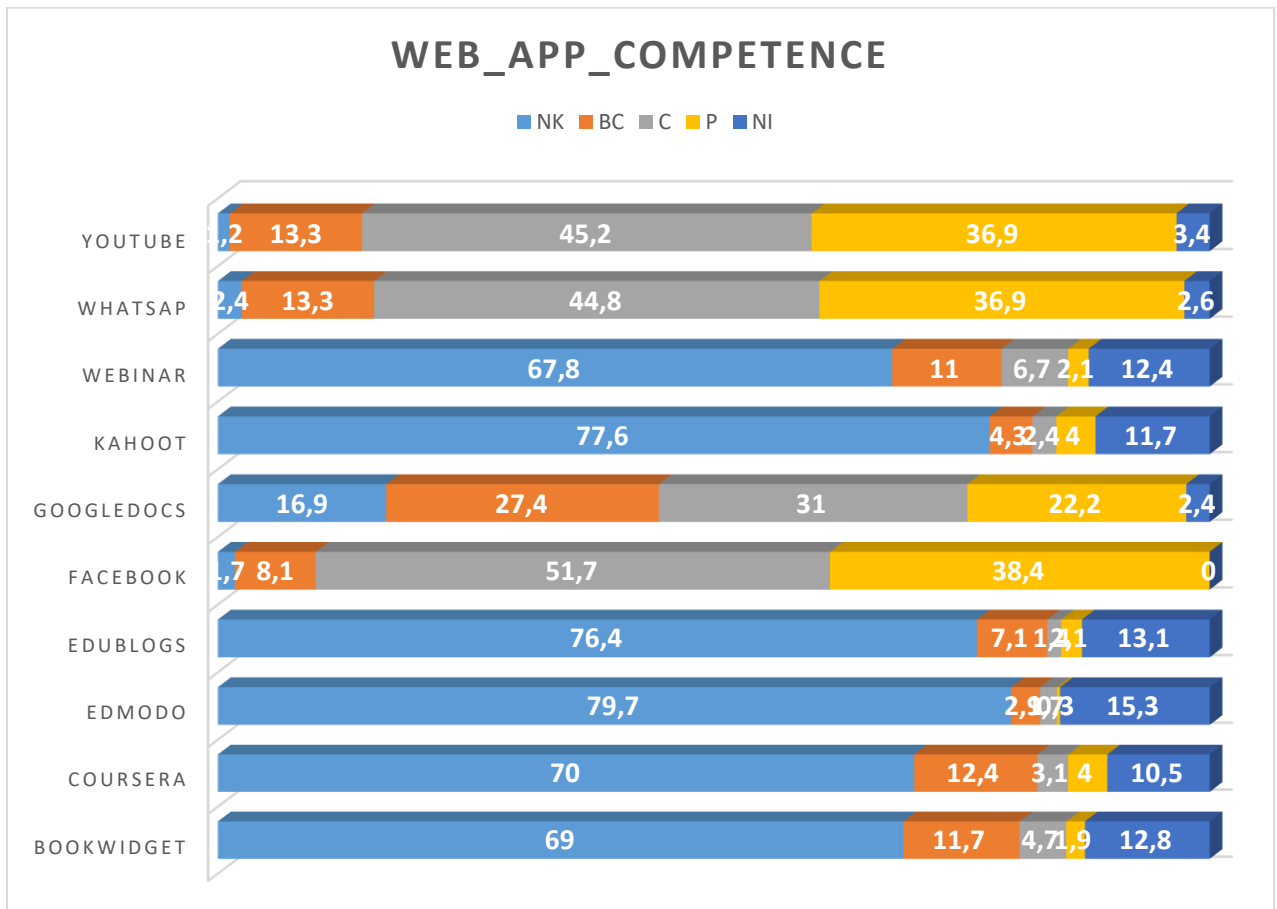
3.1.1.4. Response about competence in Web 3.0

To provide answers regarding Research Question 3, the participants were asked to respond to questions on the survey related to their comfort level of using Web 3.0

technologies. They were also asked to rate the number of teachers who use Web 3.0 in their teaching methods.

Figure 19 provides the results of the analysis of three Moroccan EFL university students' levels of proficiency with Web 3.0 Application. The result reveals that the highest proficiency scores for using Web 3.0 Applications is with Facebook (38.4%), YouTube (36.9%), and WhatsApp (36.9%), while Kahoot (4%), Webinar (2.1%), BookWidget (1.9%), and Edmodo (0.3%) were the least-used technologies.

Figure 20 Percentage of students' competence in Web 3.0 Apps



NK stands for No Knowledge, BC stands for Basic Concept, C stands for Competent, P stands for Proficient, NI stands for No Idea

As was referred to in the literature review, much concern has been raised in relation to students' technological competence, mainly the extent to which they can effectively

manipulate Web applications. To better divulge such an issue, the informants were asked to report their level of competence in ten examples of the most known Web 3.0. More precisely, they were asked to report the extent to which they are knowledgeable and ignorant about their awareness and competence in using the ten Web 3.0. For this purpose, the DigCompEdu Model was used to score their proficiency in Web 3.0.

To illustrate, Figure 20 (see above) and Tables 38 (see below) reveal that same respondents have different levels of competence in the different underlined Web 3.0 platforms. Yet, Facebook, WhatsApp and YouTube are still outperforming the other Web 3.0 technologies at the level competence among students. That is to say, a descriptive statistic of the figure and tables display that, on the one hand, a great number of the respondents claim they do not have any knowledge as to BookWidget (69%), Coursera (70%), Edmodo (79.7%), Edublogs (76.4%), Kahoot (77.6%), and Webinar (67.8%). On the other hand, an important number ranges from basic concept via competent to proficient in Facebook, WhatsApp and YouTube. As a result, half of the respondents (51%) assign themselves as 'competent' while more than a third of are 'proficient' (38.4%). A third of the respondents (31%) assign themselves as 'competent' in GoogleDocs. About half of the respondents (44.8%) assign themselves as 'competent' and more than a third (36.9%) as 'proficient' in WhatsApp. Similarly, about half of the respondents (45.2%) assign themselves as 'competent' and more than a third (36.9%) as 'proficient' in YouTube.

Table 38 Percentage of Students' Competence in Web 3.0

bookwidg_comp

		Frequency	Percent	Valid Percent	Cumulative Perce
Valid	no knowledge	400	69,0	69,0	69,0
	basic concept	68	11,7	11,7	80,7
	competent	27	4,7	4,7	85,3
	proficient	11	1,9	1,9	87,2
	I don't know	74	12,8	12,8	100,0
	Total	580	100,0	100,0	

courser_comp

		Frequency	Percent	Valid Percent	Cumulative Perce
Valid	no knowledge	406	70,0	70,0	70,0
	basic concept	72	12,4	12,4	82,4
	competent	18	3,1	3,1	85,5
	proficient	23	4,0	4,0	89,5
	I don't know	61	10,5	10,5	100,0
	Total	580	100,0	100,0	

edmod_comp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no knowledge	462	79,7	79,7	79,7
	basic concept	17	2,9	2,9	82,6
	competent	10	1,7	1,7	84,3
	proficient	2	,3	,3	84,7
	I don't know	89	15,3	15,3	100,0
	Total	580	100,0	100,0	

edubl_comp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no knowledge	443	76,4	76,4	76,4
	basic concept	41	7,1	7,1	83,4
	competent	8	1,4	1,4	84,8
	proficient	12	2,1	2,1	86,9
	I don't know	76	13,1	13,1	100,0
	Total	580	100,0	100,0	

facebook_comp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no knowledge	10	1,7	1,7	1,7
	basic concept	47	8,1	8,1	9,8
	competent	300	51,7	51,7	61,6
	proficient	223	38,4	38,4	100,0
	Total	580	100,0	100,0	

googldc_comp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no knowledge	98	16,9	16,9	16,9
	basic concept	159	27,4	27,4	44,3
	competent	180	31,0	31,0	75,3
	proficient	129	22,2	22,2	97,6
	I don't know	14	2,4	2,4	100,0
	Total	580	100,0	100,0	

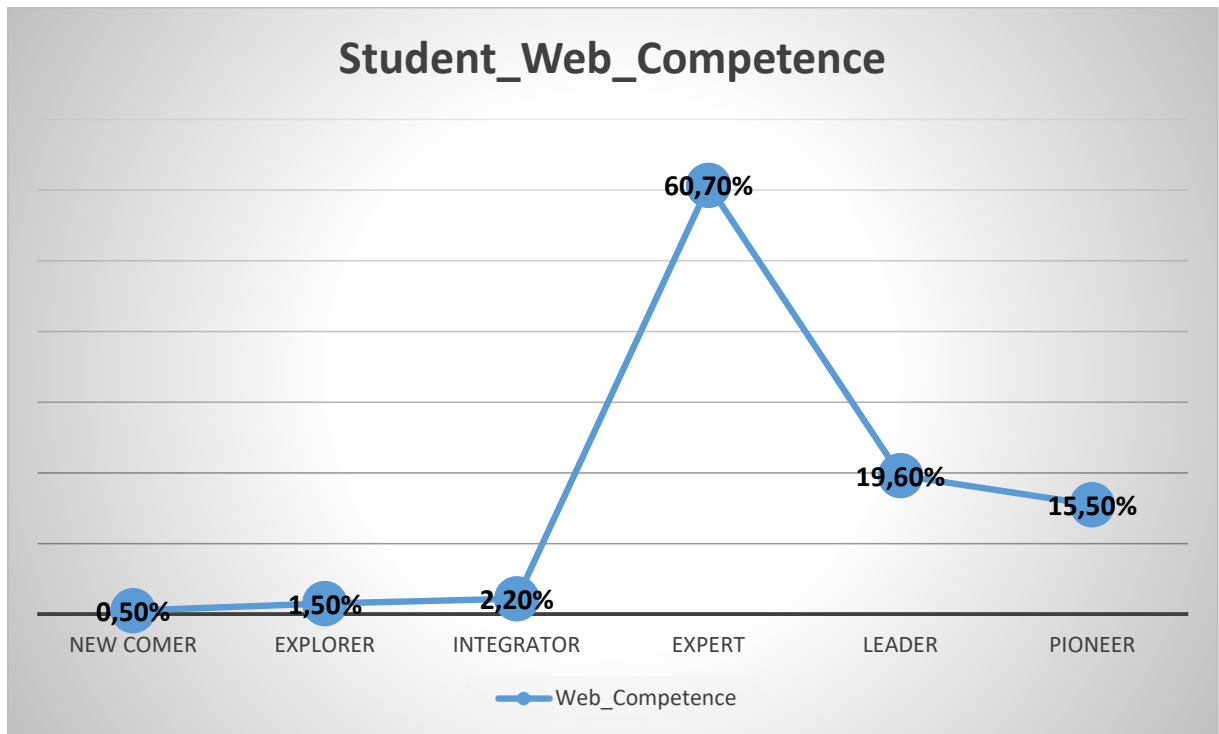
kahoot_comp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no knowledge	450	77,6	77,6	77,6
	basic concept	25	4,3	4,3	81,9
	competent	14	2,4	2,4	84,3
	proficient	23	4,0	4,0	88,3
	I don't know	68	11,7	11,7	100,0
	Total	580	100,0	100,0	

Webinr_comp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no knowledge	393	67,8	67,8	67,8
	basic concept	64	11,0	11,0	78,8
	competent	39	6,7	6,7	85,5
	proficient	12	2,1	2,1	87,6
	I don't know	72	12,4	12,4	100,0
	Total	580	100,0	100,0	

whatsp_comp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no knowledge	14	2,4	2,4	2,4
	basic concept	77	13,3	13,3	15,7
	competent	260	44,8	44,8	60,5
	proficient	214	36,9	36,9	97,4
	I don't know	15	2,6	2,6	100,0
	Total	580	100,0	100,0	

youtub_comp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no knowledge	7	1,2	1,2	1,2
	basic concept	77	13,3	13,3	14,5
	competent	262	45,2	45,2	59,7
	proficient	214	36,9	36,9	96,6
	I don't know	20	3,4	3,4	100,0
	Total	580	100,0	100,0	

Figure 21 Percentage of students' Web 3.0 overall competence



Concerning the students' general competence in Web 3.0, Figure 21 (see above) and Table 39 (see below) show that most (60.7% =N351) students sound 'expert' according to the DigCompEdu Model analysis while about a third of the participants (19.6% =N120) are considered as 'leader'. Another important number of the respondents (15.5% =N87) report to be 'pioneer'. Again, a very low percentage of the respondents (2.2% = N11) and (1.5% = N8) are 'integrator' and 'explorer' respectively. Last, only 0.5%=N3 of the respondents are just 'new comer'.

Table 39 Percentage of students' Web 3.0 overall competence

	Frequency	Percent	Valid Percent	Cumulative Percent
expert	351	60,7	60,7	60,9
explorer	8	1,5	1,5	62,2
integrator	11	2,2	2,2	64,4
Valid leader	120	19,6	19,6	84
new comer	3	,5	,5	84,5
pioneer	87	15,5	15,5	100,0
Total	580	100,0	100,0	

Overall, Table 40 depicts the descriptive statistics of predictors and outcome measures and highlights the average score for each composite variable in the analysis. Web 3.0 competence is $M=2.30$ ($SD=1.53$), teachers' use of Web 3.0 is $M=2.70$ ($SD=0.891$), and satisfaction is $M=3.97$ ($SD=1.815$).

Table 40 Descriptive Statistics of Predictors and Outcome Measures

	N	Mean	Std. Deviation
competence	580	2,30	1,501
attitudes	580	3,49	1,213
teacher_use	580	2,70	,891
Satisfaction	580	3,97	1,815
Valid N (listwise)	580		

3.2. Sequence 2: Teacher Questionnaire

As to the second sequence, the qualitative part provides data from questionnaires administered to faculty members from three nonprobability convenience samples of the three Moroccan universities (SMBAU, MIU, AUI). Like its previous quantitative counterpart, this section is structured into four major sections covering the different issues examined in this

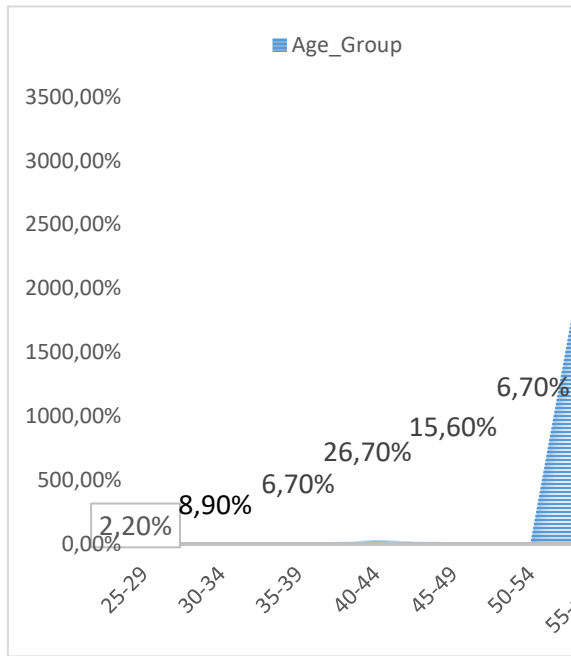
study. The first section stands for teacher's demographic profiles. The second section refers to teachers' awareness and use of Web 3.0 apps. The third section entails teachers' attitudes towards the incorporation of Web 3.0 with the purpose of empowering students' SDL. The fourth section provides data about teachers' actual level of competence in some Web 3.0 apps.

3.2.1. Description of Independent Variables: demographic attributes

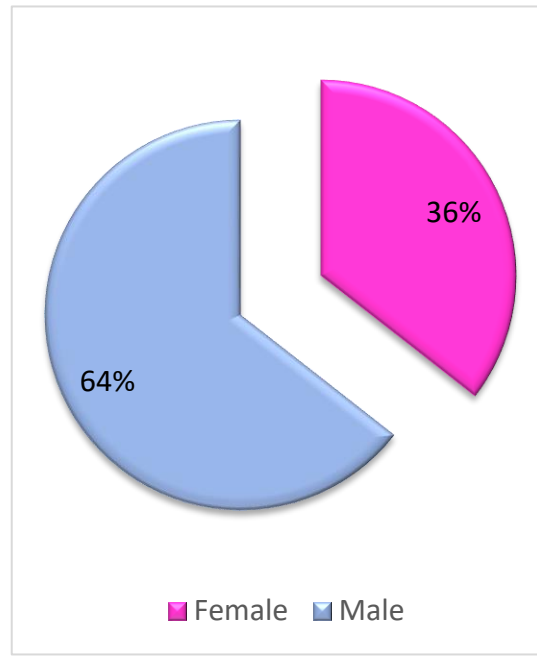
3.2.1.1. Distribution of Gender, Age, Institution, & Teaching Experience

This demographic section includes four items describing teachers' age group, gender, university of affiliation, experience of teaching,

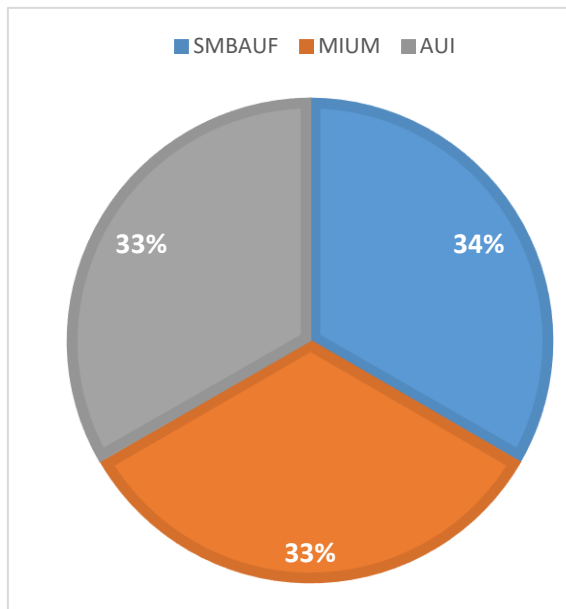
Figure 22 Demographic Dashboard of Teachers Distribution



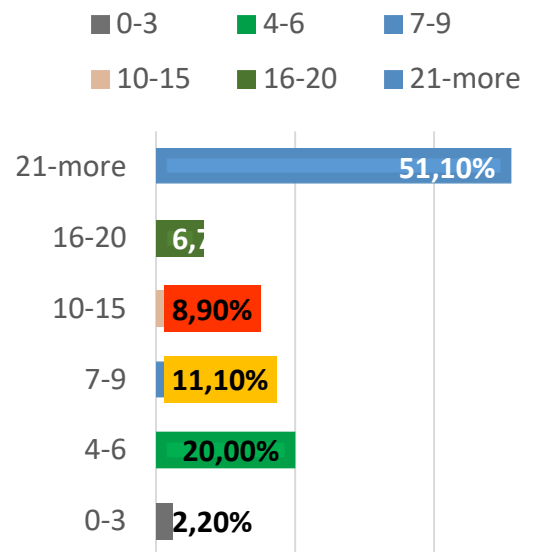
(a) age distribution



(b) gender distribution



(c) institution distribution



(d) teaching experience

Generally speaking, the sample size of the respondents to the emailed questionnaire is N 45. A thorough data are revealed in Tables 41 through 44 (below) and Figure 22 (above) which stands for a dashboard that comprises the first four items of the demographic section such as age group, gender, university of affiliation, and experience of teaching.

The first table of frequency and Figure 22 (a) in the dashboard show that overall of the 45 subjects of the study that are used 35.6% (N 16) teachers who are females and 64.4% (N 29) males, a slight equal gender distribution between females and males. It can also be viewed that the range of teachers' age is between 25 and more than 55 years old, more than a third of the teachers are aged more than 55 (33.3% = N15) and between 40 and 44 (26.7% = N12). 15.6% (N7) are between 45 and 47. 8.9% (N4) are aged between 30 and 34. An equal percentage (6.7 = N3) are situated in 35-39 and 50-54 age group respectively. Last, only one teacher (2.2% =N1) has the 25-29 age group.

As to the experience of teaching, half of the sample size (51.1% =N23) have more than 21 years of teaching experience. About a third of the teachers (20% =N9) are between 4 and 6 years experienced. Five teachers (11.1%) have between 7 and 9 years of teaching experience. Four teachers (8.9%) are experienced from 10 through 15 years. Three teachers (6.7%) have 16 to 20 years of experience. Last, only one teacher (2.2%) has less than 3 years of teaching experience.

Concerning the university of affiliation, Table 43 and Figure 22 (c) in the dashboard reveal an equal institution distribution among the three universities in the sense that 33.3% = N15 indicate that their university of affiliation is SMBAU, 33.3% = N15 indicate that their university of affiliation is MIU, and 33.3% = N15 indicate AUI as their university of affiliation.

Table 41 percentage of teachers' gender of distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	16	35,6	35,6	35,6
	Male	29	64,4	64,4	100,0
	Total	45	100,0	100,0	

Table 42 percentage of teachers' age group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25-29	1	2,2	2,2	2,2
	30-34	4	8,9	8,9	11,1
	35-39	3	6,7	6,7	17,8
	40-44	12	26,7	26,7	44,4
	45-49	7	15,6	15,6	60,0
	50-54	3	6,7	6,7	66,7
	55-More	15	33,3	33,3	100,0
	Total	45	100,0	100,0	

Table 43 percentage of teachers' university of affiliation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SMBAU	15	33,3	33,3	33,3
	MIU	15	33,3	33,3	66,7
	AUI	15	33,3	33,3	100,0
	Total	45	100,0	100,0	

Table 44 percentage of teachers' experience of teaching

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0-3	1	2,2	2,2	2,2
4-6	9	20,0	20,0	22,2
7-9	5	11,1	11,1	33,3
10-15	4	8,9	8,9	42,2
16-20	3	6,7	6,7	48,9
21-More	23	51,1	51,1	100,0
Total	45	100,0	100,0	

3.2.1.2. Device Ownership

As to the technological device ownership and use, the teachers respond on the type of technology device they own, and they use during their study. Figure 23 and Tables 45 through 48 (see below) reveal that almost all teachers (95.6% = N43) own a smart phone, the vast majority of teachers have their own Personal Computer (97.8% = N44), more than a half of the teachers (64.4% = N29) have a Tablet, and an important number of the respondents possess a smart watch (17.8% = N8) (see also tables 61 to 64).

Table 45 percentage of teachers' PC Ownership

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	44	97,8	97,8	97,8
No	1	2,2	2,2	100,0
Total	45	100,0	100,0	

Table 46 percentage of teachers' Smart Phone Ownership

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	43	95,6	95,6	95,6
No	2	4,4	4,4	100,0
Total	45	100,0	100,0	

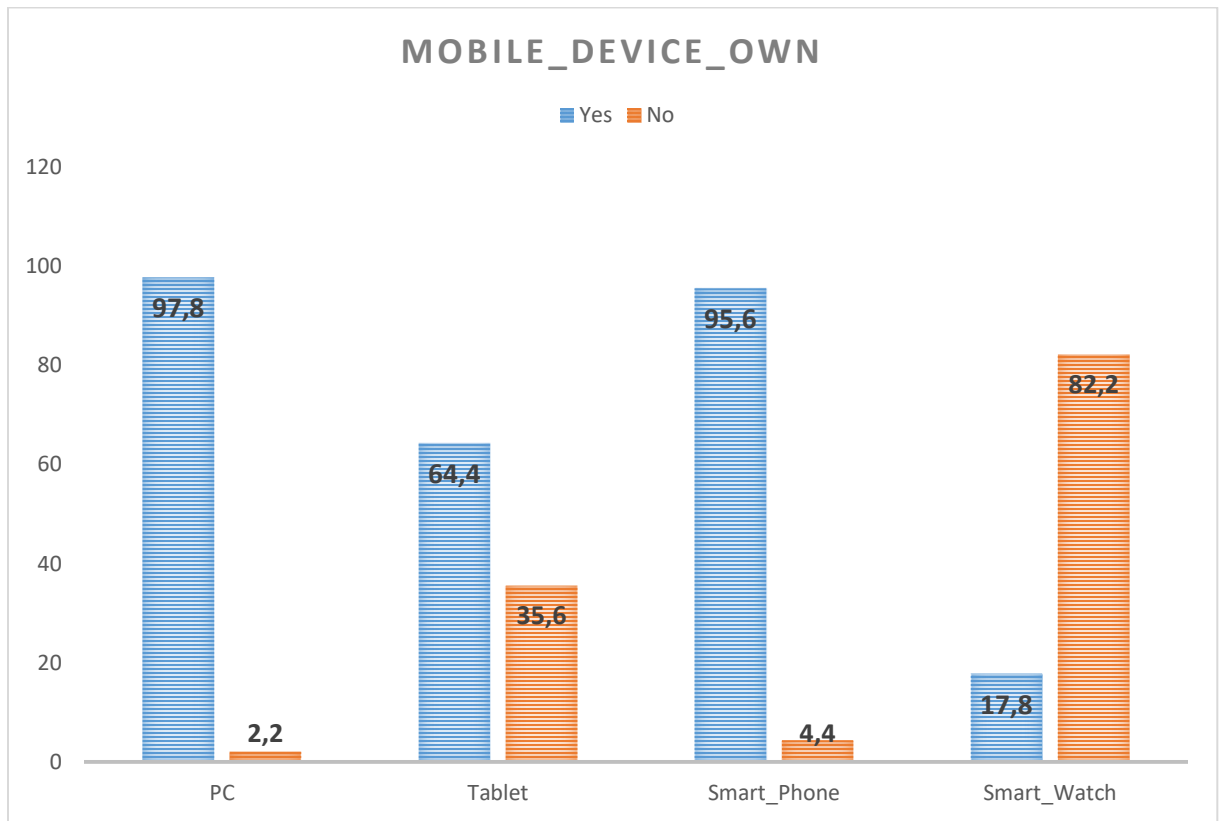
Table 47 percentage of teachers' Tablet Ownership

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	29	64,4	64,4	64,4
No	16	35,6	35,6	100,0
Total	45	100,0	100,0	

Table 48 percentage of teachers' Smartwatch Ownership

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	8	17,8	17,8	17,8
No	37	82,2	82,2	100,0
Total	45	100,0	100,0	

Figure 23 percentage histogram of teachers' device ownership



3.2.1.3. Internet Frequency Distribution

As to the teachers' use of Internet (see Figure 24 below), a great number of the subjects (98% = N44) report to have access to the Internet, while one teacher 2% (N1) states not to have Internet facility. Within the same framework, Table 50 displays that a small number (4% = N2) of the respondents report to have access to the Internet everywhere (home, school, library, café, cyber, mobile), 9% (N4) report to have Internet access in at least five places (such as mobile phone, home, café, cyber), 27% (N12) report to have Internet in at least four places, 60% (N27) report to have Internet in at least three places, while none of the respondents (0% = N0) indicate to have Internet in just two or one place.

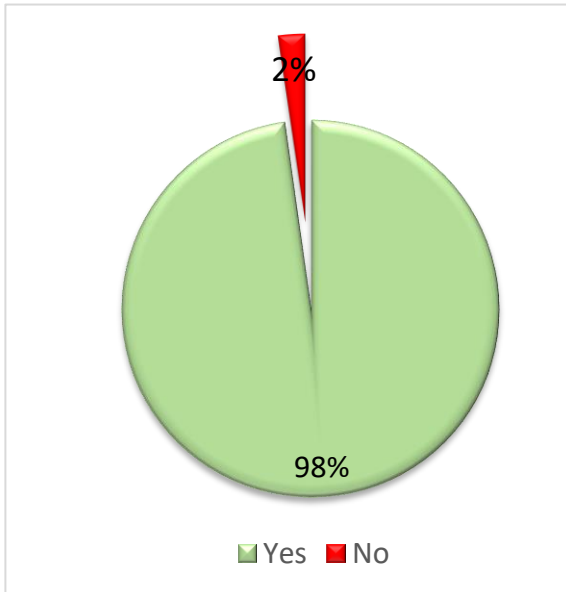
Table 49 percentage of respondents' Internet Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	44	98	98	98
	No	1	2	2	100,0
	Total	45	100,0	100,0	

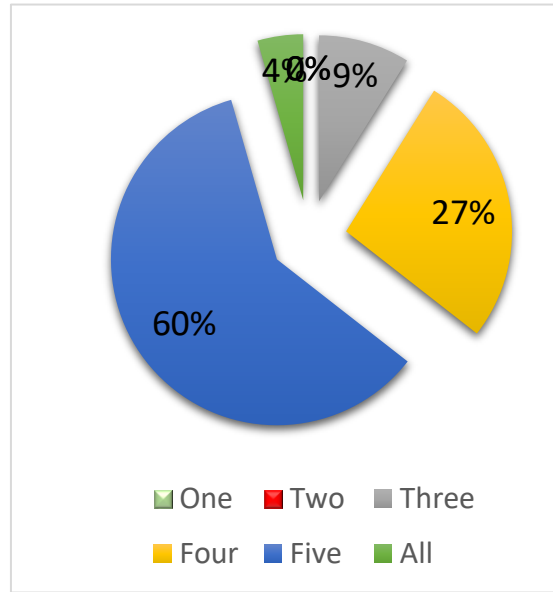
Table 50 percentage of respondents' Internet place of use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Everywhere	2	4	4	4
	five places	27	60	60	64
	four places	12	27	27	91
	three places	4	9	9	100
	two places	0	0	0	100
	one place	0	0	0	100,0
	Total	4	100,0	100,0	

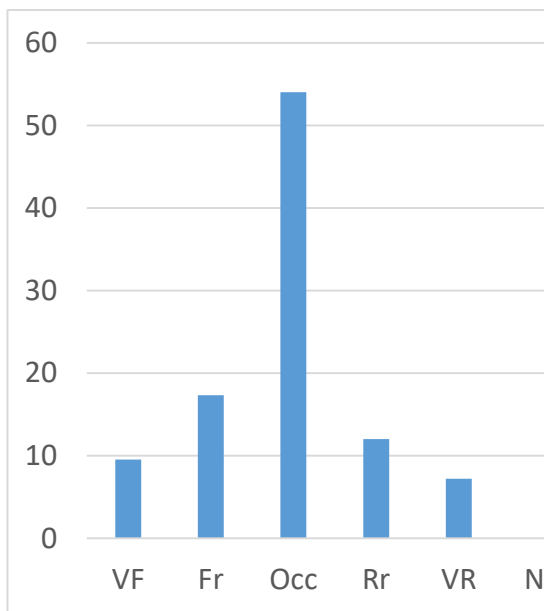
Figure 24 Percentage Dashboard of Internet frequency



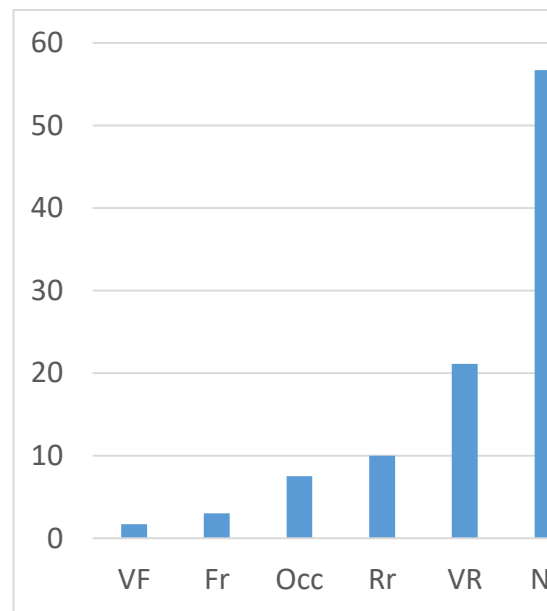
(a) Internet Access



(b) Places of Internet



(c) Internet frequency per day



(d) Internet frequency in class

VF stands for “Very Frequently”; Fr stands for “Frequently”; Occ stands for “Occasionally”; Rr stands for “Rarely”; VR stands for “Very Rarely”; Nv stands for “Never”.

Concerning teachers’ Internet frequency per day (how frequently do you use Internet per day?), more than a half of the respondents (54.4%) report to just ‘occasionally’ and a few

of them ‘frequently (17.3%) use the Internet on a daily basis while only 9.5% indicate to use the Internet very frequently per day. Besides, teachers’ feedback as to Internet frequency while teaching (how often do you use Internet in class?), more than a half (56.7%) report to ‘never’ have used Internet in class, while they ‘very rarely’ (21.1%) and rarely (10%) use the Internet inside their classrooms, yet only 1.7% of the participants use the Internet ‘very frequently’ during classrooms activities. (see Tables 51 & 52). This means that while students are frequent users of the Internet inside classroom, their teachers do not cope with this frequency and are still lagging behind technology use during the teaching/learning process.

Table 51 Percentage of the respondents' Internet frequency per day & in class

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid very frequently	310	53,4	53,4	53,4
frequently	185	31,9	31,9	85,3
occasionally	72	12,4	12,4	97,8
rarely	11	1,9	1,9	99,7
never	2	,3	,3	100,0
Total	580	100,0	100,0	

3.2.2. Description of Response to Dependent Variables

3.2.2.1. Response about Awareness of Web 3.0

This section illustrates through the use of graphics the percentage distribution for the question whether teachers are aware of the use and usage of one or more Web 3.0 technologies. It is lucid that teachers are very much familiar with the most known platforms such as Facebook, WhatsApp, GoogleDocs, and YouTube and less familiar with the other useful platforms such as BookWidget, Coursera, Edmodo, Edublogs, Kahoot, and Webinar

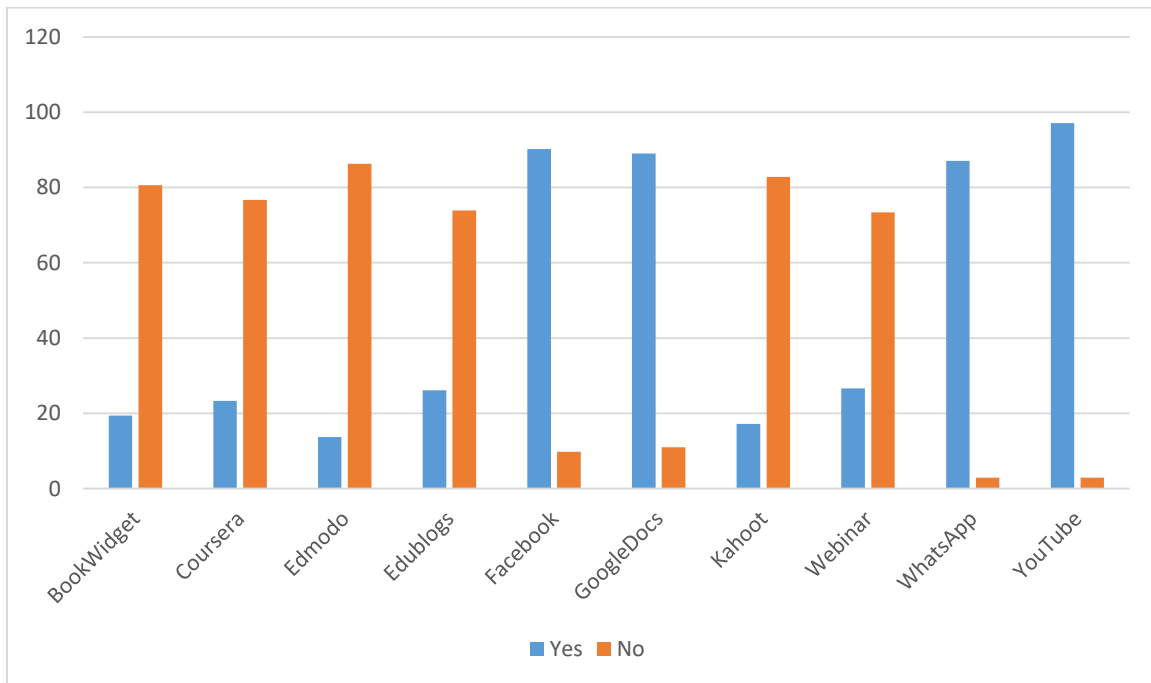
Figure 25 teachers' accounts in Web 3.0 Technologies

Figure 25 reveals that Facebook, GoogleDocs, WhatsApp and YouTube outperform the other Web 3.0 technologies in the accounts and familiarity among teachers. To put it differently, a vast majority of the respondents (90.2%, 89%, 87.1%, and 97.1%) indicate to have an account in Facebook, GoogleDocs, WhatsApp and YouTube respectively. Yet, a great number (80.6%, 76.7%, 86.3%, 73.9%, 82.8%, & 73.4%) of the respondents state they do not have an account in BookWidget, Coursera, Edmodo, Edublogs, Kahoot, and Webinar respectively.

Further, the researcher probed into the potential awareness of teachers of Web 3.0. Teachers were asked to rate to what extent they continuously reflect on how they can improve their use of new technologies in teaching and learning. Table 52 reveals that an important number (42.2%) of the respondents report that reflection is part of their daily practice, while

more than a third of the participants (33.3%) ‘sometimes’ reflect on how to improve their Web 3.0 but not continuously.

The above finding implies that university teachers are conscious about the importance of incorporating Web 3.0 in the teaching process. However, when teachers were asked to report how often they actually participate in online training opportunities such as online courses, MOOCs, Webinars, and virtual conferences, only about a third of the respondents (35.6%) have tried out different online trainings. Another third (28.9%) have not thought about attending any online training yet. Besides, only two teachers (4.4%) report they frequently participate in all kinds of online training.

Table 52 percentage table of teachers who participate in online training

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid no never	4	8,9	8,9	8,9
not yet	9	20,0	20,0	28,9
somewhat	14	31,1	31,1	60,0
yes tried	16	35,6	35,6	95,6
yes all time	2	4,4	4,4	100,0
Total	45	100,0	100,0	

3.2.2.2. Response about the Use of Web 3.0

Teachers were also asked to report whether they reflect on the digital evidence they have on learners' behavior and progress to better understand students' concerns. Table 53 reveals that about half of the teachers (46.7%) sometimes reflect on the digital evidence they have on learners' behavior and progress to better decipher their needs.

Table 53 percentage table of teachers who keep reflecting on online use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no rarely	3	6,7	6,7	6,7
	sometimes	15	33,3	33,3	40,0
	yes daily	19	42,2	42,2	82,2
	yes all time	8	17,8	17,8	100,0
	Total	45	100,0	100,0	

Again, table 54 provides evidence that six teachers (13.3%) weekly watch out for changes in students' activities. Still, more than a third of the subjects report not to be interested at all in students' issues.

Table 54 percentage table of teachers who reflect on students' digital evidences

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not at all	3	6,7	6,7	6,7
	no not available	15	33,3	33,3	40,0
	sometimes	21	46,7	46,7	86,7
	yes weekly	6	13,3	13,3	100,0
	Total	45	100,0	100,0	

In addition, the researcher asked the informants how frequently they use new Web apps to invite their students to manage their learning themselves such as using quizzes or surveys for self-directed learning, e-Portfolios for showcasing, online diaries for reflection, etc. as a result, Table 54 provides evidence that more than a third of teachers (33.3%) sometimes use Web apps to allow students monitor their learning themselves such as using

quizzes or surveys for self-assessment. Yet, about a third of the respondent (20%) report that their students have never monitored their own learning needs.

Table 55 percentage table of teachers who allow students to monitor their learning themselves

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not at all	9	20,0	20,0	20,0
	not really	8	17,8	17,8	37,8
	sometimes	15	33,3	33,3	71,1
	yes different tools	13	28,9	28,9	100,0
	Total	45	100,0	100,0	

Teachers were also asked to answer if they use any Web 3.0 apps to provide effective feedback and help their students better grasp their learning needs. Table 56 (below) displays that about half of the respondents (44.4%) are ready to offer effective feedback to support their students after each term or period of study (periodically). More than a third (33.3%) believe that this providing feedback is part of their daily practice. This implies again a positive attitude from the side of teachers, especially that there was no single respondent (0%) who ignore the need to involve students.

Table 56 percentage of teachers who provide effective feedback

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not really	10	22,2	22,2	22,2
	periodically	20	44,4	44,4	66,7
	yes frequently	15	33,3	33,3	100,0
	Total	45	100,0	100,0	

Teachers were well along required to reply whether they use Web 3.0 apps to help their students customize learning chances in the sense they for example provide students a variety of Web 3.0 assignments with the aim of addressing individual learning needs, preferences and interests. Table 57 reveals that 42.2% of the respondents report to have provided online activities for the students who are advanced or those who are lagging behind.

Table 57 percentage of teachers who support individual learning

	Frequency	Percent	Valid Percent	Cumulative Percent
not at all	12	26,7	26,7	26,7
not really	7	15,6	15,6	42,2
Valid yes for some	19	42,2	42,2	84,4
yes by level	7	15,6	15,6	100,0
Total	45	100,0	100,0	

3.2.2.3. Response about the Satisfaction with Web 3.0

As to teachers' satisfaction with the use of Web 3.0 among students, the researcher infers responses through the question whether they monitor their students' involvement in the collaborative online settings they use. Here, Table 58 (below) displays that half of the teachers (51.1%) indicate to sometimes monitor learners' behavior and engagement in the collaborative digital environments they use. As well 13.3% of the respondents report that they regularly check on their students and regularly intervene with motivating or correcting comments.

Within the same framework, teachers' higher satisfaction is confirmed through the question whether they allow online apps for students to generate documents evidence when they work in groups. Table 59 (see underneath) shows that when students prepare a team activity, 46% of teachers encourage the use of online apps to generate and document evidence.

Table 58 percentage table of teachers who monitor students' behavior

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not at all	4	8,9	8,9	8,9
	not really	6	13,3	13,3	22,2
	sometimes	23	51,1	51,1	73,3
	yes regularly check	6	13,3	13,3	86,7
	yes regularly intervene	6	13,3	13,3	100,0
	Total	45	100,0	100,0	

Further, 28.9% of the respondents sometimes authorize their students to resort to the Internet to find information and present their result in digital format. However, only two teachers (4.4% of the sample) encourage their extensively students their students to exchange evidence and jointly create knowledge in a collaborative online space.

Table 59 percentage table of teachers who encourage group students to generate online documents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not at all	5	11,1	11,1	11,1
	not really	4	8,9	8,9	20,0
	sometimes	13	28,9	28,9	48,9
	yes often	21	46,7	46,7	95,6
	yes extensively	2	4,4	4,4	100,0
	Total	45	100,0	100,0	

To stimuli teachers' acceptance of using Web 3.0 apps in order to encourage students' active involvement, the researcher demands from the respondents to rate how they engage students in online activities. Table 60 shows that about a half of the respondents (42.2%) use online videos and animations while instructing. Then, more than a third of the participants

(26.7%) believe that their students regularly engage themselves with online technologies, for example, electronic worksheets, games, and mock quizzes.

Table 60 percentage of teachers who encourage students' involvement

	Frequency	Percent	Valid Percent	Cumulative Percent
not at all	3	6,7	6,7	6,7
not really	8	17,8	17,8	24,4
yes when instructing	19	42,2	42,2	66,7
Valid yes regular engage	12	26,7	26,7	93,3
yes all time	3	6,7	6,7	100,0
Total	45	100,0	100,0	

For further investigation of teachers' satisfaction with the use of Web 3.0 technologies in the enhancement of students SDL, they were asked if they have taught their students how to behave safely and responsibly online. As it is clearly demonstrated through Table 61 (below), an important number of respondents (46.7%) strategically explain existing rules and (22.4%) discuss and agree on rules of conduct. Only two teachers (4.4%) declare that rules are not necessary and that students only use safe environments.

Table 61 percentage of teachers who teach safety

	Frequency	Percent	Valid Percent	Cumulative Percent
not necessary	2	4,4	4,4	4,4
not really	10	22,2	22,2	26,7
yes explain	21	46,7	46,7	73,3
Valid yes discuss	11	24,4	24,4	97,8
yes strategically	1	2,2	2,2	100,0
Total	45	100,0	100,0	

3.2.2.4. Response about teachers' competence in Web 3.0

Within the aim of finding out the contribution of university teachers in enhancing students' SDL as a key element to ILOs, the researcher includes in the teachers' questionnaires questions related to the frequency of use and level of proficiency as of Web 3.0. the outcomes of teachers' responses are displayed in Tables 62 through 64 which present details concerning how frequently and what for purpose teachers make use of Web 3.0, while Tables 62 through 67 show how teachers are proficient in such use. Besides, Table 73 (see Competence Construct, page 183) reveals the actual level of teachers' competence as to Web 3.0.

Table 62 percentage table of teachers who use different online communication tools for different purposes

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid not really	1	2,2	2,2	2,2
sometimes	11	24,4	24,4	26,7
yes respect	8	17,8	17,8	44,4
yes strategically	25	55,6	55,6	100,0
Total	45	100,0	100,0	

As to question five, Table 62 (see above) reveals that more than a half of the respondents (55.6%) report to strategically opt for different online communication tools for different purposes. e.g. E-mail with students; Facebook for general audience; Apps for students' groups and WhatsApp with colleagues, etc. As to question six, Table 63 (below) displays if teachers use online technologies to work together with colleagues inside and

outside their institution, and it presents data that about half of the responding teachers (56%) indicate that they frequently use online technologies to exchange material with colleagues inside and outside their school especially via interactive social media and emails. As well, about a half (46.7%) use different Internet sites and search strategies to find and select online resources e.g. using educational platforms and repositories or online professional networks to identify suitable worksheets, presentations, videos, pictures, games, quizzes, apps, sites to set up blogs, and wikis. Still, only one respondent (2.2%) reports to have created materials with other opposite numbers from other institutions in online networks.

Table 63 percentage table of teachers who use technology with colleagues inside & outside

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid a little	4	8,9	8,9	8,9
sometimes	19	42,2	42,2	51,1
yes frequently	21	46,7	46,7	97,8
yes jointly	1	2,2	2,2	100,0
Total	45	100,0	100,0	

To better understand how teachers include Web 3.0 Apps in their teaching process, they were asked to rate their frequency of using different new Internet technologies and search strategies to find online resources such as using educational platforms and repositories and online professional networks to identify suitable worksheets, presentations, videos, pictures, games, quizzes, and other apps. Hence, Table 64 shows that 46.7% of teachers daily reflect on how they can improve their use of new technologies in teaching and learning. It is pointed out that a third of teachers tried to participate in online training opportunities e.g. online courses, MOOCs, Webinars, virtual conferences, yet only 4% regularly attend such training.

Table 64 percentage of Teachers' Use of Different Web 3.0 Apps

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not at all	1	2,2	2,2	2,2
	not really	5	11,1	11,1	13,3
	somewhat	8	17,8	17,8	31,1
	yes frequently	21	46,7	46,7	77,8
	yes strategically	10	22,2	22,2	100,0
	Total	45	100,0	100,0	

Again, the researcher attempts to infer more understanding of teachers' use of Web 3.0 through asking them whether they have set up any task that requires students to use online technologies to interact with each other. Table 64 more than a half of the respondents (57.8%) report to have noticed that their students partly communicate with each other online. Still, only one teacher (2.2%) confirms to have provided online assignments in a structured way allowing students to slowly expand their skills.

Table 65 Percentage of Teachers Providing Online Assignments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not at all	5	11,1	11,1	11,1
	not really	4	8,9	8,9	20,0
	Partly	26	57,8	57,8	77,8
	yes internal & external com	9	20,0	20,0	97,8
	yes structured way	1	2,2	2,2	100,0
	Total	45	100,0	100,0	

Within the same line of thought, Table 65 (see above) presents more details concerning the educational use of Web 3.0, which tells if teachers put assignments that require from students to create online content like digital videos, audios, photos, and slide sharing. It is clearly seen (Table 66) that 40% of the participants confirm that online learning is an integral part of their students' study. Yet, about a third of the participants (20%) assert that student do not create any online content. Plus, there is no teacher who uses Web 3.0 strategically.

Table 66 Percentage of Teachers who Creating Online Content

	Frequency	Percent	Valid Percent	Cumulative Percent
not at all	9	20,0	20,0	20,0
not really	7	15,6	15,6	35,6
Valid sometimes for fun	11	24,4	24,4	60,0
yes integral part	18	40,0	40,0	100,0
Total	45	100,0	100,0	

Likewise, teachers' actual level of expertise in working with Web 3.0 apps entails the researcher to add six questions in order to allure deep understanding of teachers' proficiency. First, they are asked to what extent they create their own online resources and modify existing ones to adapt them to their students' needs such as presentations, worksheets, videos, blogs, and quizzes. Table 67 shows that a third of teachers (31.1%) confirm to have adjusted existing online resources to meet their students' needs. Four teachers (8.9%) admit that they have never created any online resource, nor have they modified any existing platform.

Table 67 percentage table of teachers who create their own Web Apps & modify existing ones

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid not at all	4	8,9	8,9	8,9
not consistently	10	22,2	22,2	31,1
somewhat	17	37,8	37,8	68,9
yes password	14	31,1	31,1	100,0
Total	45	100,0	100,0	

As to the second question, teachers are expected to state whether they know how to effectively protect online sensitive content such as exams and students' grades. Table 68 (see below) shows an equal distribution among values (third for each). A third size of the sample (31.1%) who effectively protect sensitive content for each student mainly exam grades. Another third of the sample (33.3%) believes that the school takes care of such a protection. And the last third (28.9%) state that they do not consistently consider protecting students' privacy. Fortunately, there is no single teacher who has never thought of the issue.

Table 68 percentage table of teachers who protect sensitive data

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid not really	13	28,9	28,9	28,9
somewhat	15	33,3	33,3	62,2
yes support	14	31,1	31,1	93,3
yes for each	3	6,7	6,7	100,0
Total	45	100,0	100,0	

The third question of Web 3.0 competence discusses if teachers carefully consider how, when and why to incorporate Web 3.0 apps in class, to ensure that they are used with added value. Table 69 shows that over half of the teachers (55.6%) somewhat make sure that their digital presentation is understandable and interesting. carefully consider how, when and why to use digital technologies in class, to ensure that they are used with an added value. The table also displays that a third of the sample size (28.9%) frequently resort to Web 3.0 technologies to support individual and group work. Last, only one teacher (2.2%) reports to have never used technology in class.

Table 69 percentage table of teachers who consider how, when & why to use Web 3.0 in class

	Frequency	Percent	Valid Percent	Cumulative Perce
Valid not at all	1	2,2	2,2	2,2
not really	2	4,4	4,4	6,7
sometimes	25	55,6	55,6	62,2
yes frequently	13	28,9	28,9	91,1
yes regularly	4	8,9	8,9	100,0
Total	45	100,0	100,0	

Table 70 percentage table of teachers who consider their students' digital problems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not at all	13	28,9	28,9	28,9
	not really	8	17,8	17,8	46,7
	yes by minimizing prob	17	37,8	37,8	84,4
	yes by enabling std	6	13,3	13,3	97,8
	yes by allowing variety	1	2,2	2,2	100,0
	Total	45	100,0	100,0	

By asking the fourth question, the researcher delves into a deep understanding of how teachers consider students' concerns when they provide online tasks. Examples of the concerns are the lack of access to technological devices such as PCs/tablets/smartphones, lack of students' Internet competence, and unequal access to e.g. e-mail, Facebook, google docs, WhatsApp. Table 70 (above) shows that when teachers create digital assignments for learners, 37.8% of them consider and try to minimize problems they may have with the digital format; for example, lack of access to digital devices or Internet, interoperability and conversion problems when using PCs/tablets/smartphones, learners' lack of digital competence, unequal access to like e-mail, Facebook, Google docs, and WhatsApp.

The fifth question deals with the possibility that the instructors teach their students how to check if online information is reliable or fake. Table 71 (below) provides data that more than a half of the respondents (53.3%) teach students about reliable and unreliable resources. Yet, a third of the respondents (22.2%) believe that it is not their responsibility to teach this.

Table 71 percentage table of teachers who encourage their students to check if information is reliable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not at all	1	2,2	2,2	2,2
	not really	10	22,2	22,2	24,4
	yes teach reliable source	24	53,3	53,3	77,8
	yes discuss	5	11,1	11,1	88,9
	yes comprehensively	5	11,1	11,1	100,0
	Total	45	100,0	100,0	

For the sixth question, the researcher tends to infer from teachers how often they encourage their students to use Web 3.0 apps in the learning process to creatively solve concrete problems. Table 72 displays that a vast number of the participants (64.4%) report to push students to rely on technologies to solve some learning problems.

Table 72 percentage table of teachers who encourage students to solve problems using Web 3.0

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not really	4	8,9	8,9	8,9
	occasionally	29	64,4	64,4	73,3
	yes often experiment	12	26,7	26,7	100,0
	Total	45	100,0	100,0	

As a construct teachers' Web 3.0 competence, Table 73 and Figure 26 depict that the mode of 'expert' is the highest (40% =N18), while 'pioneer' is the lowest (2.2% =N1). As to the rest of Web 3.0 competencies, there are 13.3% (N6), 4.4% (N2) and 4.4% (N2) 'integrator', 'explorer' and 'leader' respectively.

Table 73 percentage table of teachers' competence in Web 3.0

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid expert	18	40,0	40,0	40,0
explorer	6	13,3	13,3	53,3
integrator	16	35,6	35,6	88,9
leader	2	4,4	4,4	93,3
new comer	2	4,4	4,4	97,8
pioneer	1	2,2	2,2	100,0
Total	45	100,0	100,0	

Figure 26 teachers' digital competence



In brief, the statistics deliver a good distribution of competence levels across teachers' subjects of study. The competences that had the highest mean scores are likely selecting digital resources, teaching and reflective practice. Teachers with a higher level of digital teaching confidence and those with more years of teaching experience are more likely to have higher digital competence scores.

3.3.Sequence 3: Experiment (teaching with Kahoot)

In the third sequence, the researcher investigates if there is a change in the factors of satisfaction and competence of students before and after the exposure to an authentic Web 3.0 App. The purpose is also to deduce whether there is a change in the scales of SDL before and after working with Web 3.0 interactivities. Participants' rates of Web 3.0 of interactions based on the differences in gender and age are also examined. The gain scores for the pretest and posttest were used to analyze the third research question (Dimitrov & Rumrill, 2003).

The researcher chose Edmodo for pilot study and three Web 3.0 Aps (Kahoot, Quizlet, & Edmodo) for the real current study because the findings in the first sequence (online questionnaire) reveal that a vast majority of the respondents assign themselves as ignorant about Edmodo (79.7%) and Kahoot (87.6%), which are highest percentage among the other Web 3.0 technologies.

A comparison of the informants' answers in the two questionnaires before the exposure to Web 3.0 Apps and after experiencing Web 3.0 Apps reported a significantly greater frequency of participation orientation in the post-test. They also reported significantly greater confidence in their knowledge and skills related to participation readiness.

3.3.1. Description of Demographic Attributes

Figure 27 age group distribution of experienced students

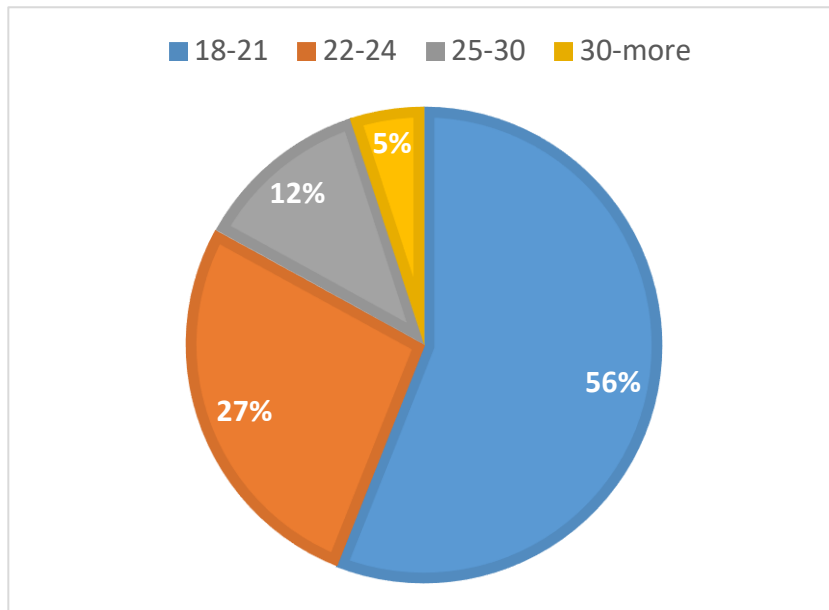
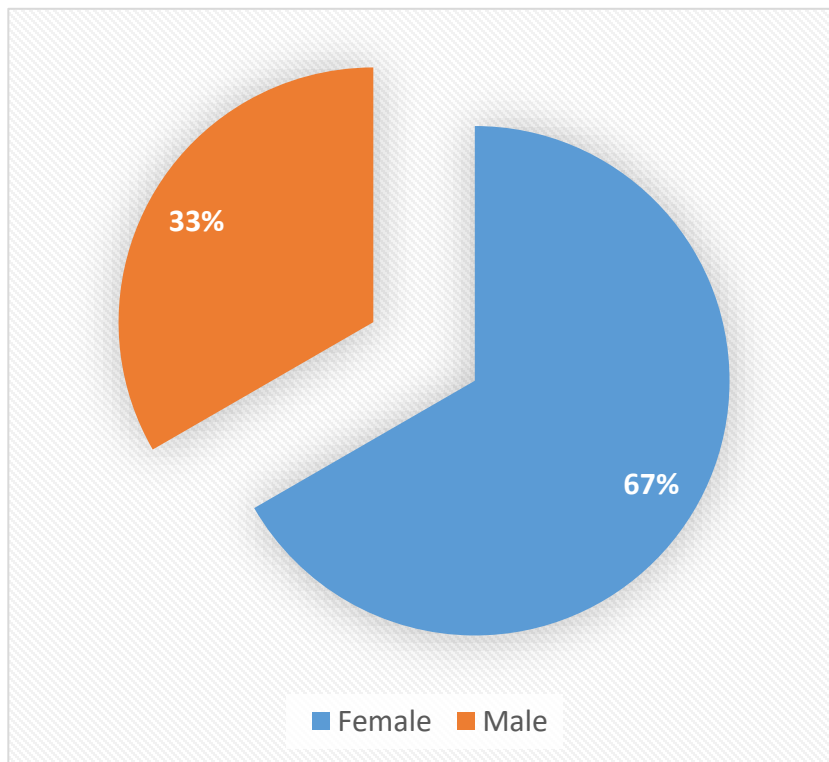


Figure 28 gender distribution of experienced students



Figures 27 and 28 depict the demographic constructs for this study. The majority of participants' age is from 18 to 21 years old (56% young learners). For gender, 67% of the informants reported female and 33% reported male. For the subject matter, all of the informants are students of Public Speaking Skills (100%). For Mobile Device ownership, a great number of participants report to own at least a smart cell phone (93%) and a personal computer (89%), while more than a half report to obtain a tablet (61%) and a very small number of informants have a smart watch (13%).

3.3.2. Description of Dependent Variables

3.3.2.1. Response about Awareness of Web 3.0

Figure 29 and Figure 30 (see below) reveal that participants are not aware about the educational role of many Web 3.0 applications such as Kahoot, Webinar and Edmodo, while they are used to working with Facebook and YouTube. These data are before their exposure to the experience (learning with Kahoot).

Figure 29 students' familiarity with Web 3.0 (before)

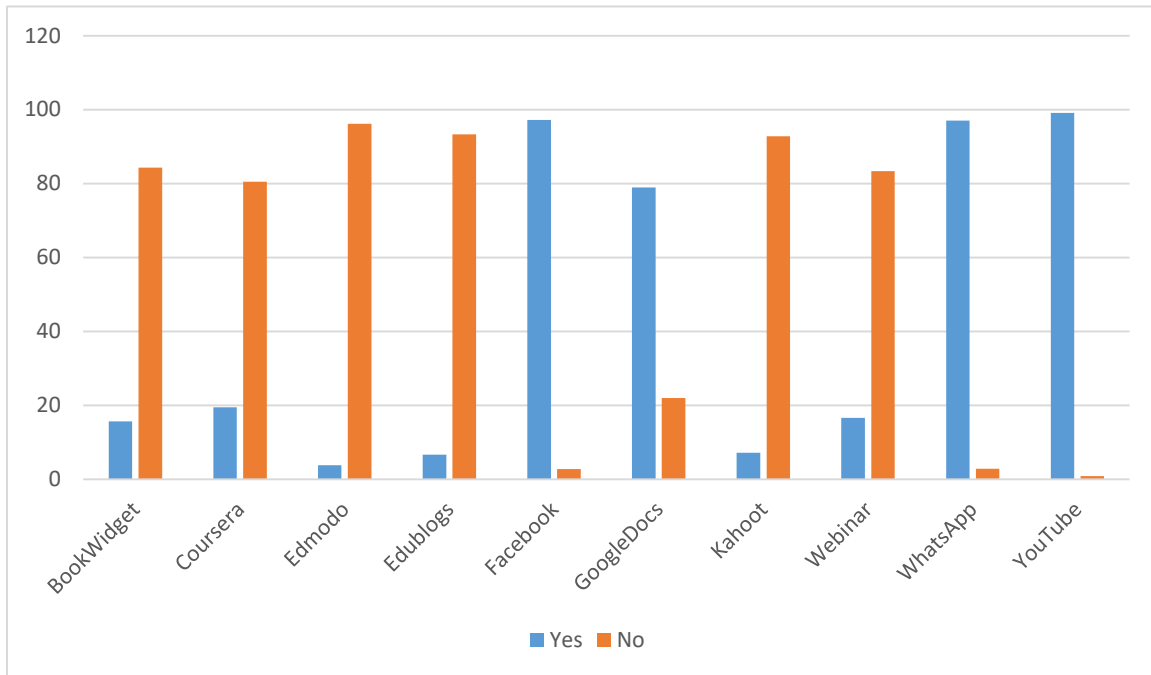
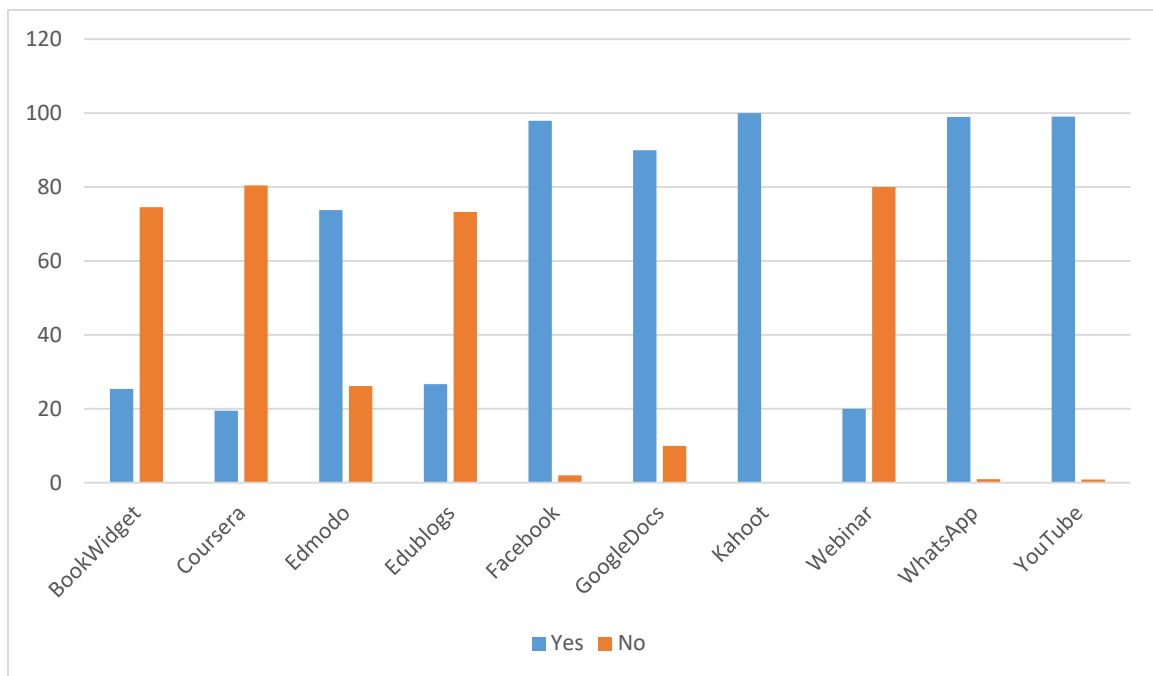


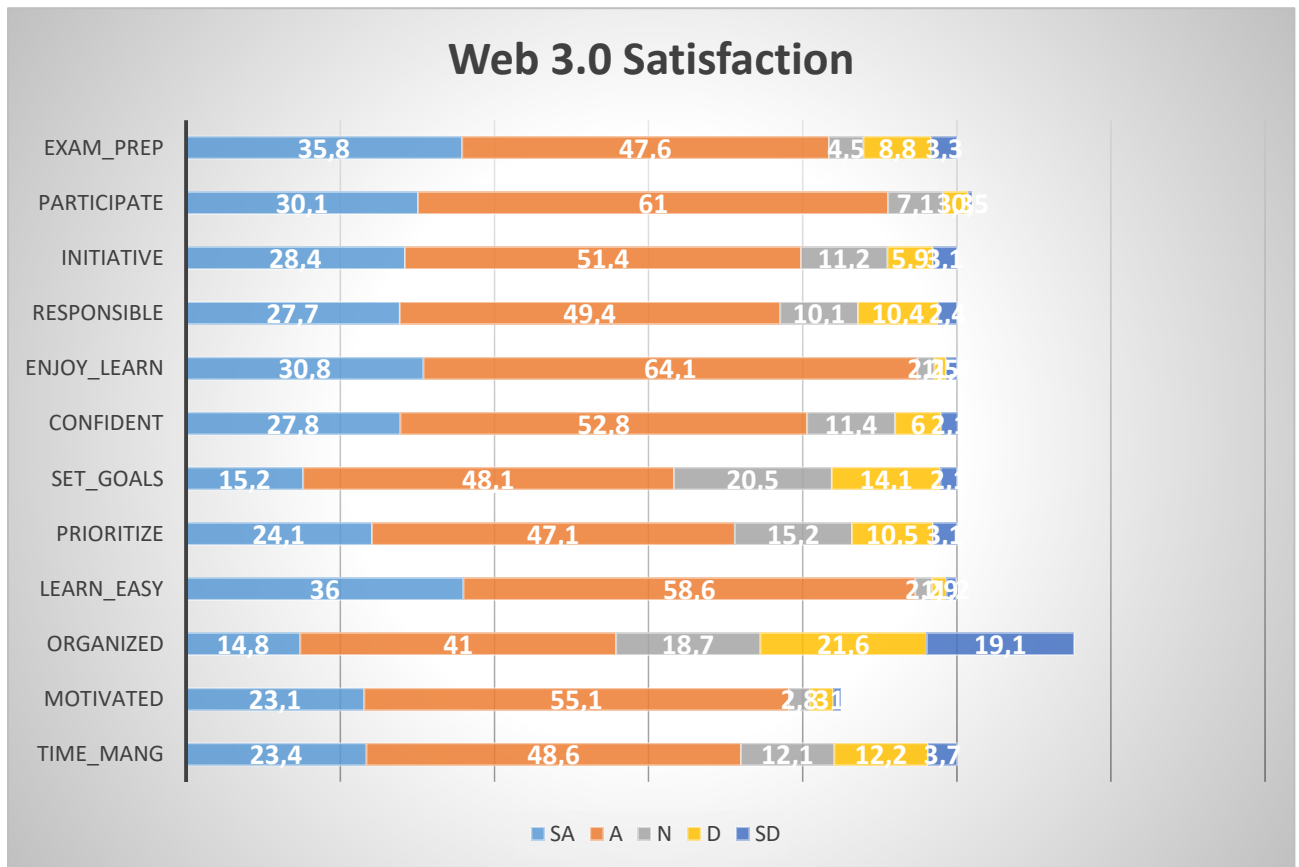
Figure 30 students' familiarity with Web 3.0 (after)



3.3.2.2. Response about Satisfaction with Web 3.0

A paired t-test was used to compare the participants’ pre-survey and post-survey responses to see whether there is any positive significance of the incorporation of Web 3.0. In-depth comparative analysis of the frequent user and infrequent user of Web 3.0 during the 4 weeks was also conducted through an independent t-test to identify whether frequency of accessing Web 3.0 produced different results. A t-test is usually used in analysis of data collected from research involving the pre-and-post project (Johnson, 1978). In addition, a chi-square test was conducted to examine whether there was a correlation between the frequency of Web 3.0 logging in and reported changes of learners’ participation attitudes.

Figure 31 students' overall satisfaction with Web 3.0 in SDL enhancement



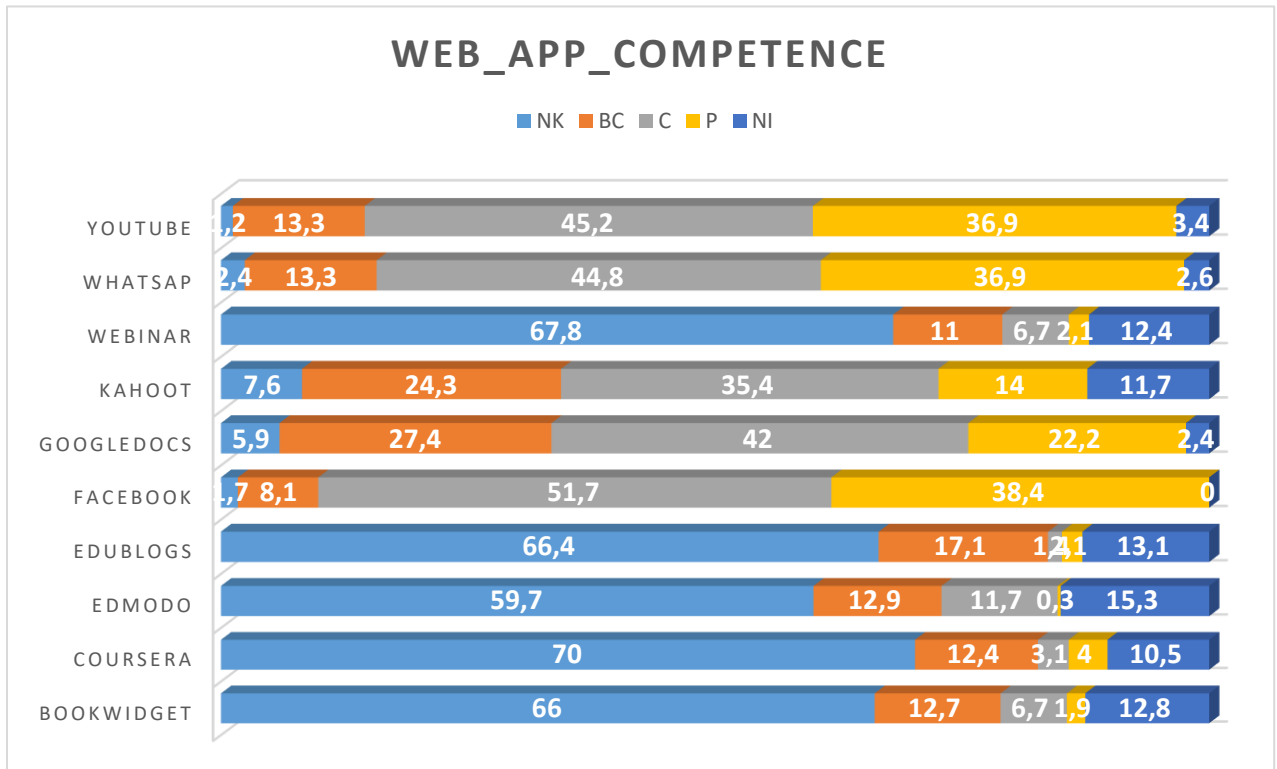
SD stands for Strongly Disagree, D stands for Disagree, N stands Neutral, A stands for Agree, SA stands for Strongly Agree

As to learning preferences, more than half of the respondents report to prefer both online and face-to face instruction, while a third of participants report to prefer to be instructed through Web 3.0 technologies, and a tiny portion reports to choose face to face instruction. Other elements related to the informants' participation, positive attitudes and aptitudes were reported towards Web 3.0 Apps, positive attitudes of the compatibility of Web 3.0 Apps with their learning needs' diagnosis and outcomes' evaluation, and positive perceptions of the subjects' expectations of Web 3.0 Apps use for Public Speaking and participation in the post-survey than in the pre-survey.

3.3.2.3. Response about Competence in Web 3.0

A paired t-test was used to infer the significant variation in the scores of each participant indicating the pre-and-post proficiency (Borji, Tavakoli, Sihite, & Itti, 2013). The survey's outcomes reveal that participants did not have basic competencies of main Web 3.0 Applications such as Kahoot, Edmodo, & BookWidgets before their exposure to Web 3.0 project (see Figure 28), while they become not only aware but competent at the use and interaction through such applications after the participation in the project (see Figures 29 & 30) abilities that did not transfer into high skill levels in the use of other technologies. Further, Figure 31 shows the overall satisfaction of participants with downloading and uploading of their individual activities as well as with their live interaction while using Web 3.0.

Figure 32 percentage of students' Web 3.0 competence after experience



NK stands for No Knowledge, BC stands for Basic Concept, C stands for Competent, P stands for Proficient, NI stands for No Idea

Additionally, 25 out of the 39 participants (66%) reported improving their participation. The chi-square test between self-reported frequency of Web 3.0 Apps and Public Speaking was significant indicating that the frequency of accessing Web 3.0 Apps was correlated with the change in mastering Public Speaking. A closer examination of the data showed that the majority of the frequent users (91%) reported promoting their participation and thus developing their Public Speaking skills after experiencing Web 3.0 Apps interaction. This finding confirms that Web 3.0 Apps was reported to have a positive effect on the informants' participation especially among the participants who frequented Web 3.0 Apps.

To spot whether there is a statistically significant difference between the pretest and posttest means of Web 3.0 level of students' competence, a two-tailed paired samples t-test is

run in SPSS. Such a test provides a mean score of 7.97 with a standard deviation of 14.47. The results of the paired samples t-test yielded a score of 5.37 at a p-value of 0.001 indicating a highly statistically significant difference between the pretest and posttest means of mastery experience. Therefore, the null hypothesis is rejected and the second Hypothesis (H_2) is confirmed.

Further, in addition to the Regression analysis an independent-sample T-test was conducted to evaluate the effect of the incorporation of Web 3.0 technologies on students' interactivity with their peers and teachers. Results of the T-test indicate, for hypothesis 2, there was a statistically significant finding, Eta squared (.50) indicating a large effect. A post-hoc analysis was performed, and paired t-tests were calculated between each pair of measurements to examine in greater depth the differences that may appear among the variables in the study. There was a statistically significant decrease in the t-value of the second sequence of the study from time 1 ($M = 41.73$, $SD = 5.19$) to time 2 ($M = 35.18$, $SD = 5.14$), $t(27) = 5.37$, $p < .001$ (two-tailed). The mean decreased in time 2 was 2.34 with a 91% confidence interval ranging from 1.56 to 3.71, and the eta squared statistics (.50) indicted a large effect size. As a result, the null hypothesis was rejected and the alternate hypothesis was accepted, as the analysis indicated support for the alternate hypothesis was appropriate. Hence the third Hypothesis (H_3) is confirmed.

3.4. Summary of the Descriptive Results

Data are analyzed to determine means, standard deviations and significance among the three sequences. These statistics aid in the description of students' and teachers' awareness of Web 3.0 tools, frequency of Web 3.0 use, their satisfactions with Web 3.0 interactivity, and their level of proficiency in integrating in the educational setting. Descriptive statistics

confirm that there exists a positive impact of Web 3.0 apps in the three sequences. In this section, detailed tables, graphs, and explanations of the data collected throughout the surveys in the three sequences for scrutinizing insights from university students and teachers about Web 3.0's stimuluses to enhancing SDL and thus actualizing ILOs is given.

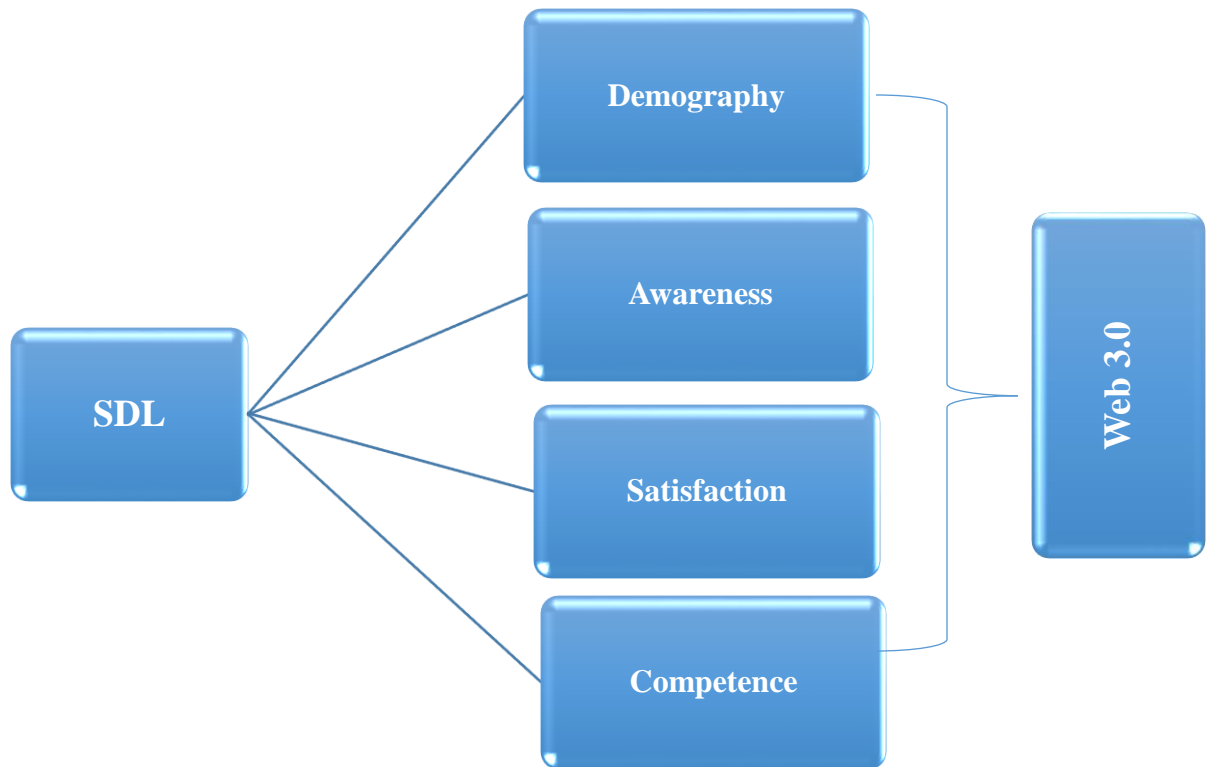
4. Factor Analysis and Inferential Statistics

The use of factor analysis²³ contributes to infer the multilayered assembly the effectiveness of the different variables tackled in the research project (Swisher, Beckstead, & Bebeau, 2004), and the use of factor analysis strengthens the consistency of all the items under each construct (ibid). Here, all the sixty survey items were analyzed using the Statistical Package for the Social Sciences (SPSS) software.

Indeed, factor analysis is conducted by means of the maximum likelihood extraction method, and the suitability of factor analysis is determined by investigating the values on the Kaiser-Meyer-Olkin measure of sampling adequacy, which meet the minimum criteria with a value of .784. A score between .7 and .8 is considered middling and suitable for factor analysis (Dziuban & Shirkey, 1974). The significance on Bartlett's Test of Sphericity was high .000, which is also an acceptable value to conclude there are appropriate correlations in the data set suitable for conducting a factor analysis (Qi, Shen, & Dou, 2017). Most of the communalities' extractions are above .7, which is an acceptable level to meet the Eigenvalue criteria in the communalities table (Mertler & Reinhart, 2016).

²³ Factor Analysis is an SPSS data reduction technique using a smaller set of different variable factors.

Figure 33 SDL Model & Diagrams (source, myself)



The questionnaire's items were divided into four constructs, and each construct was given a name. The construct validity of the variables was supported by positive significant correlations. The Pearson correlation coefficient was run for each construct, and it was positive and significant (see Appendix A). A model was created for this purpose (see Figure 33 above), and it combines the four diagrams assembling the 60 items. The first construct stands for 'demography' assembling 12 items age group, gender, university of affiliation, level of study, device ownership, Internet use and frequency. The second construct stands for 'Awareness' gathering 10 items Web 3.0 Apps accounts. The third construct stands for 'satisfaction' referring to 8 items (learning style preferences, Web 3.0 load, Web 3.0 usefulness, and attitudes to Web 3.0 Apps. The fourth construct stands for 'competence' revealing students' competence and use of Web 3.0, and it comprises 14 items.

Accordingly, four linear regression analyses were performed to test the research hypothesis and thus answer the research questions. The first regression analysis examines the relationship between the independent variable of Demographic items with the outcome variable of SDL enhancement through Web 3.0 Apps. The second regression analysis examines the relationship between the independent variable of Web 3.0 Awareness with the outcome variable of students' SDL. The third regression analysis examines the relationship between the independent variable of students' satisfaction as to the enhancement of their SDL while using Web 3.0 applications. The fourth regression analysis examined the relationship between the independent variables of students' Web 3.0 competence and use with their SDL enrichment. All predictors were significantly associated with the outcome of the enhancement of SDL as an element of ILOs.

The following graphs display the outcomes of the single and composed track analysis for the predictors that contribute to the enhancement of student's SDL while using Web 3.0. The decomposed outcome for device ownership is ($R^2 = .171a$, adjusted $R^2 = .022$, Sig = .000). The decomposed outcome for Internet usage is ($R^2 = .212a$, adjusted $R^2 = .037$, Sig = .000). The decomposed outcome for students' awareness of Web 3.0 is ($R^2 = .251a$, adjusted $R^2 = .051$, Sig = .000). The decomposed outcome for students' satisfaction with the use of Web 3.0 is ($R^2 = .415a$, adjusted $R^2 = .166$, Sig = .000). The decomposed outcome for teachers' actual integration of Web 3.0 is ($R^2 = .292a$, adjusted $R^2 = .074$, Sig = .000). The decomposed outcome for students' competence in Web 3.0 is ($R^2 = .306a$, adjusted $R^2 = .078$, Sig = .000). Finally, the decomposed result for teachers' competence in Web 3.0 is ($R^2 = .171a$, adjusted $R^2 = .022$, Sig = .000).

4.1. Demographic Construct.

A crosstabulation is made between different demographic variables and Web 3.0 constructs. The variables include gender, age, and institutions, and three Web 3.0 constructs. The first construct stands for Web 3.0 use and comprises students' accounts of the most common Web 3.0 applications and their frequency of use inside and outside schools. The second construct comprises students' perceptions and satisfactions with the usefulness of Web 3.0, and it is named Web 3.0 satisfaction construct. the third construct which stands for Web 3.0 competence brings together students' knowledge and skills in the use of Web 3.0 technologies.

4.1.1. Overall Web 3. 0 Construct by Gender Distribution

An analysis is conducted to infer participants' overall use of Web 3.0 Apps by gender. Data collected and presented in Table 74 (below) show high frequency of using Web 3.0 technologies for gender of female (n = 71; 57.1%), male (n = 40; 42.9%). Data collected and presented in Table 75 (below) report an equity for highly satisfaction while using Web 3.0 Apps for gender of female (n = 238; 57.1%), male (n = 218; 42.9%). Data collected and presented in Table 76 (underneath) indicates level of proficiency in Web 3.0 for gender of female (n = 192; 0.0%), male (n = 117; 100.0%). This implies that female students have more intention and readiness to study with the new Web 3.0 technologies. This contributes to confirming the second Hypothesis (H₂).

Table 74 frequency of Web 3.0 use by gender

	Web_use						Total
	never	very rarely	rarely	occasionally	frequently	very frequently	
Female	71	70	33	80	44	27	325
Male	63	63	17	72	31	9	255
Total	134	133	50	152	75	36	580

Table 75 frequency of Web 3.0 satisfaction by gender

	Web_satif					Total
	highly unsatisfied	unsatisfied	indifferent	satisfied	highly satisfied	
Female	7	13	67	98	140	325
Male	3	11	23	145	73	255
Total	10	24	90	243	213	580

Table 76 frequency of Web 3.0 competence by gender

	Web_comp				Total
	no knowledge	basic concept	competent	proficient	
Female	46	87	122	70	325
Male	66	72	58	59	255
Total	112	159	180	129	580

4.1.2. Overall Web 3.0 Construct by Age Distribution

An analysis is conducted to infer participants' overall use of Web 3.0 Apps by age group. Data collected and presented in Table 77 (below) shows more frequent use of Web 3.0 technologies for age group of 18-21 (n = 309; 57.1%), 22-24 (n = 103; 42.9%), 25-29 (n = 35), more than 30 (n= 9). Data collected and presented in Table 78 (below) reports for satisfaction while working with Web 3.0 Apps for age group of 18-21 (n = 70; 57.1%), 22-24

(n = 30; 42.9%), 25-29 (n = 10), more than 30 (n= 1). Data collected and presented in Table 79 (below) indicates level of proficiency in Web 3.0 for age group of 18-21 (n = 205; 57.1%), 22-24 (n = 80; 42.9%), 25-29 (n = 18), more than 30 (n= 6). This implies that young students are more satisfied and competent than their elder counterpart.

Table 77 frequency of Web 3.0 use by age

	Web_use						Total
	never	very rarely	rarely	occasionally	frequently	very frequently	
18-21	97	96	33	105	47	23	401
22-24	30	34	12	29	23	7	135
25-29	6	0	3	16	5	5	35
30-More	1	3	2	2	0	1	9
Total	134	133	50	152	75	36	580

Table 78 frequency of Web 3.0 satisfaction by age

	Web_satisf					Total
	highly unsatisfied	unsatisfied	indifferent	satisfied	hailghy satisfied	
18-21	7	10	75	148	161	401
22-24	3	14	15	69	34	135
25-29	0	0	0	20	15	35
30-More	0	0	0	6	3	9
Total	10	24	90	243	213	580

Table 79 frequency of Web 3.0 competence by age

	Web_comp				Total
	no knowledge	basic concept	competent	proficient	
18-21	73	123	128	77	401
22-24	34	21	45	35	135
25-29	4	13	5	13	35
30-More	1	2	2	4	9
Total	112	159	180	129	580

4.1.3. Overall Web 3.0 Construct by Institution Distribution

An analysis is conducted to infer participants' overall use of Web 3.0 Apps by type of institution. Data collected and presented in Table 80 (below) shows more frequent use of Web 3.0 technologies for institution of SMBAU (n = 35), MIU (n = 39), AUI (n = 46). Data collected and presented in Table 81 (below) reports for satisfaction while working with Web 3.0 Apps for age group of SMBAU (n = 166), MIU (n = 159), AUI (n = 151). Data collected and presented in Table 82 (below) indicates level of proficiency in Web 3.0 for age group of SMBAU (n = 87), MIU (n = 76), AUI (n = 91). This implies that there is no difference between the students in the three universities under study and their overall use of Web 3.0 technologies.

Table 80 frequency of Web 3.0 use by institution

	Web_use						Total
	never	very rarely	rarely	occasionally	frequently	very frequently	
SMBAU	55	30	34	41	22	13	195
MIU	62	42	10	55	14	5	188
AUI	17	61	6	56	39	18	197
Total	134	133	50	152	75	36	580

Table 81 frequency of Web 3.0 satisfaction by institution

	Web_satisf					Total
	highly unsatisfied	unsatisfied	indifferent	satisfied	hailghy satisfied	
SMBAU	0	0	19	82	94	195
university MIU	1	2	26	107	52	188
AUI	9	22	45	54	67	197
Total	10	24	90	243	213	580

Table 82 frequency of Web 3.0 competence by institution

	Web_comp				Total
	no knowledge	basic concept	competent	proficient	
SMBAU	48	60	59	28	195
university MIU	60	62	42	24	188
AUI	4	37	79	77	197
Total	112	159	180	129	580

4.1.4. Overall Web 3.0 use by Device Construct

A multiple regression was run to predict students' Web 3.0 SDL enhancement (outcome) based on the independent variables (predictors) of Device Ownership, Internet usage, awareness, attitudes, Web 3.0 integration, and Web 3.0 competence. The multiple regression model predicted with statistical significance the overall students' SDL while using Web 3.0 technologies ($F [3, 259] = 41.273, p < .05, R^2 = .323, \text{adj. } R^2 = .316$), with standardized coefficients (Betas) of (.289, .193, .238). The variable added statistical significance to the prediction, $p < .05$.

Table 83 ANOVA of SDL & Device Ownership

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	3660,509	4	915,127	4,328	,002 ^b
Residual	121587,980	576	211,457		
Total	125248,490	580			

a. Dependent Variable: SDL

b. Predictors: (Constant), smart_watch_own, smart_ph_own, pc_own, tablet_own

Table 84 Coefficient of SDL & Device Ownership

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	54,057	5,125		10,548	,000
1 pc_own	1,313	1,684	,033	,779	,436
tablet_own	1,169	1,397	,038	,837	,403
smart_ph_own	-8,635	4,901	-,073	-1,762	,079
smart_watch_own	6,306	2,104	,132	2,997	,003

Table 84 (above) shows a summary of the multiple regression analysis and provides the regression coefficients and standard errors for each individual and composed path. A multiple regression was run to predict the importance of incorporating Web 3.0 applications in the learning-teaching process with the hope of enhancing students' SDL from the variables of Device Ownership, Internet Use, Web 3.0 Awareness, attitudes to Web 3.0, and Web 3.0 competence. There was linearity as assessed by partial regression plots and a plot of standardized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.132 (Farebrother, 1980) .

4.2. Awareness Construct

As to teachers' use of Web 3.0 applications in the teaching process to enhance their students' SDL as an element of ILOs, the Likert-scale examination displays significant evidence concerning the teachers' rates of using Web 3.0 technologies in the instruction activities. The descriptive data for the teachers' responses are demonstrated in Tables 41 through 47 and 81 through 84.

Table 85 ANOVA between SDL and Students' Internet & Device Frequency

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	5632,170	5	1126,434	5,405	,000 ^b
Residual	119616,320	575	208,391		
Total	125248,490	580			

a. Dependent Variable: SDL

b. Predictors: (Constant), internet_inclas, Device_BYOD, internet_access, internet_where, internet_freq

In spite of the fact that very few teachers formally integrate Web 3.0 applications in the instruction process, more than a half of the respondents indicate to have used Web 3.0 technologies in students' life. In addition, a high percentage of the informants' report that teachers communicate with their students via Web 3.0 asynchronously and synchronously, and almost the same percentage states that teachers use different Web 3.0 tools for different instruction purposes. However, a tiny number is reported to have used Web 3.0 on a regular basis.

Table 86 ANOVA between SDL and Students' Web 3.0 Awareness

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	8487,967	11	848,797	4,136	,000 ^b
Residual	116760,523	569	205,203		
Total	125248,490	580			

a. Dependent Variable: SDL

b. Predictors: (Constant), Web 3.0 Apps

In addition to the ANOVA, a T-test measures display significant pre-post increase in Web 3.0 acquaintance, and the F-value outcome show that participants 'confidence, classroom activities and individual experience with technology positively predict awareness and easiness enhancement. Pretest responses demonstrate that students who have limited Web 3.0 awareness are less active participants in classroom, while posttest feedbacks tell that students who become Web 3.0 knowledgeable are more active participants. This implies that the third Hypothesis (H₃) is confirmed.

4.3. Satisfaction Construct

Satisfaction with the incorporation of Web 3.0 in the enhancement of SDL could be based on the willingness (Jung, 1921) of teachers and students to act or react in a particular manner, the welcome that may be considered as a convention (Eagly & Chaiken, 1993) and the wont to respond which correlates with the rate low or high satisfaction about such integration (Saligrama, 2008). In this project, the researcher attempts to measure the respondents' overall satisfaction both quantitatively through the self-administered online questionnaire and posttest assessment and categorically through emerging themes emanating from respondents' open-ended answers and comments. Scrutinizing such outcomes helps to decipher the strengths and weaknesses of Web 3.0 technologies in the empowerment of students' SDL.

Table 87 Model Summary concerning Web Satisfaction

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,395 ^a	,156	,150	13,55755

a. Predictors: (Variable), live, browse, uplaod, download

b. Predictors: (Constant), Web 3.0

Table 88 ANOVA test between means of SDL and Web 3.0 functions

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19559,432	4	4889,858	26,603	,000 ^b
	Residual	105689,058	576	183,807		
	Total	125248,490	580			

a. Dependent Variable: SDL

b. Predictors: (Constant), live, browse, uplaod, download

The third research question allures some features of students and teachers regarding their satisfaction as to Web 3.0 applications before and during the involvement of the applications. The respondents' degrees of satisfaction are measured in three sequences survey data. Examination of questions #1-9, and 20-23 of the first sequence data for students' online questionnaire (Tables 87, 88 and 10) indicate willingness, wont and enthusiasm for Web 3.0 contribution in the enhancement of SDL. Mean scores for the SDL elements improvement ranges from 3.33 – 4.86 and standard deviations ranges from 1.433 – 2.032. Mean score for Web 3.0 usefulness and preferences ranges from 2.87-4.65 and standard deviations ranges from 1.655 – 2.108, denoting a wider range than the other two groups, thus greater variability. Standard error of the means for all groups on the pre-survey indicated mean scores were reliable.

Analysis of the outcomes achieved from the second sequence versus the first sequence highlights specific questions that were significant. A two-way within-subjects analysis of variance was conducted to evaluate the effect of Web 3.0 on the level of satisfaction among students in the two sequences. The degree of satisfaction in both sequences was highly significant. This paves the way for the fourth Hypothesis (H₄) the fifth Hypothesis (H₅) to be confirmed.

4.4. Competence Construct

According to Table 88, the means of the four level of competence of teachers' and their integration of Web 3.30 differ from one respondent to another. In fact, participants who report themselves as proficient obtain the highest mean score (M=2.64, SD =0.58), followed by respondents who report themselves as competent with a mean score of 2.41 (SD=0.64). Also, participants who have basic knowledge scored a mean of 1.20 (SD=0.80). Actually, the highly competent participants record the highest mean score (M=1.20, SD=1.02). These results are well represented in the following Figure. The means plot for competence construct and Web 3.0 inclusion reveal that proficient teachers are more expected to integrate Web 3.0 technologies in their classroom activities. Therefore, there are differences between teachers' use of Web 3.0 based on competence as the ANOVA result demonstrates in the following tables.

Table 89 Model Summary of Teachers' Competence

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,846 ^a	,716	,715	7,84563

a. Predictors: (Constant), Teacher Score

Table 90 ANOVA between SDL and Teachers' Competence

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	89670,322	2	89670,322	1456,777	,000 ^b
Residual	35578,168	578	61,554		
Total	125248,490	580			

a. Dependent Variable: SDL

b. Predictors: (Constant), Teacher Score

The findings of the one-way ANOVA test displays that there are statistically significant differences in the means of teachers' level of competence in using different Web 3.0 Apps with their students, $F(3,159)=20.455, p<0.05$, and the P value ($p = 0.000$) is smaller than the significant level set at 0.05 (2-tailed), the null hypothesis indicating that there are no significant differences between the two variables is rejected. The effect size, calculated utilizing eta squared, is 0.27. For a linear regression, the following guidelines are used: 0.01=small effect, 0.06=moderate effect, 0.14=large effect (Cohen, 2013). The magnitude of the differences in the means is large (eta squared =0.27). This means that 27% of the variance in teachers' incorporation of Web 3.0 in classroom activities is explained by competence. In other words, competence is not the only factors influencing teacher's willingness to integrate Web 3.0 in their teaching practices.

In addition to the ANOVA, a Chi-square Test of Independence was conducted to examine whether the incorporation of Web 3.0 technologies in higher education and the enhancement of students' SDL were independent of one another. Results of the Chi-square test indicate for hypothesis 1 there is a statistically significant result, $\chi^2(2) = 31.58, p = .001$. The statistical significance found suggests that Web 3.0 contributes to enhancing SDL. This implies that the null hypothesis was rejected, and the alternate hypothesis was accepted, as

the analysis indicated support for the alternate hypothesis was appropriate. Thus, the first Hypothesis (H_1) is confirmed.

Summary of the Factor Analysis and Inferential Statistics

The regression results confirmed that the four factors combined — Demography, Awareness, Satisfaction, and Web 3.0 competence — explained the significant variance (44.1%) in SDL (adjusted R^2). Examining the path analysis results, device ownership ($\beta = 1.313$, $t = .779$), Internet usage ($\beta = .295$, $t = 4.441$), awareness ($\beta = .412$, $t = 5.890$), students' attitudes ($\beta = .295$, $t = 4.441$), teachers' integration ($\beta = .412$, $t = 5.890$), students' competence ($\beta = .295$, $t = 4.441$), and teachers' competence ($\beta = .023$, $t = .414$) in Web 3.0 had significant effects on students' SDL. Therefore, the results of this study combined research hypotheses 1, 2, and 3. R^2 for the overall model was 44.7% with an adjusted R^2 of 44.1%, a large size effect.

Chapter Four: Discussion and Interpretations

4. Discussion and Interpretation

The four research questions in this study revolve around the potential contribution of Web 3.0 Apps in the enhancement of university students' self-directed learning, and its use in the ultimate intended learning outcomes.

As a reminder, the mode participant representation based on data collected through the first sequence of the present study is a freshman level of study, is in the 18-21-year age group female as gender, owns mobile device, and use Internet very frequently. The mode also displays a high satisfaction with the effect of Web 3.0 technologies in the enhancement of their SDL. As to students' competence in Web 3.0, the mode stands for expert. The second sequence reveals the mode participant representation based on data collected for teachers has a male gender, is in the 46-55-year age group, has more than fifteen years teaching experience. Yet the competence mode presents teachers as explorers.

4.1. Interpretations Elicited through Research Question 1

Question number 1: **Is there any significant correlation between different demographic variables and the use of Web 3.0 as a way of SDL learning?**

It is obvious from the first findings that demographic variables are not strong factors of students' SDL when using Web 3.0 Apps. Though there is a slight difference among gender distribution as female respondents show a bit higher rate in using Web 3.0, other demographic variables do not reveal any significant differences. As to the device ownership and Internet access, students from AUI do not differ from their counterpart in SMBAU and MIU universities. This implies that that neither the institution's equipment nor its Internet

availability has a strong effect on the use of Web 3.0 to empower students' SDL. This belief is validated through teachers' responses as their higher mode indicates that most of them share almost the same attitudes towards the incorporation of Web 3.0 technologies in classroom activities regardless of their institution of affiliation.

4.2. Interpretations Elicited through Research Question 2

Research Question 2: Are students and teachers aware of the educational role of Web 3.0?

Throughout the findings, Web 3.0 Applications are currently widely used in different ways among university students and teachers (Laurillard, 2007). Hence, this paper reveals that university students are presently involving a vast number of Web 3.0 technologies in their learning process. Besides, the fact that many students are more familiar with Facebook, WhatsApp and YouTube than other educational Web 3.0 platforms such as Kahoot, Edmodo and Webinar implies that they are interested more in the social interaction and entertainment rather than in education.

Thus, in line with findings reported by scholars in various parts of the world (Sbihi & El Jazouli, 2009; Požgaj & Vlahović, 2010; Požgaj & Vlahovi, 2010; Bati & Atici, 2010; Turkman, 2012; Kolowich, 2013; Iwamoto et al., 2017; Suwantarathip & Wichadee, 2014); Bonk, Lee, Kou, Xu, & Sheu, 2015; Karvonidis et al., 2017), the results have shown that Facebook, YouTube, and Google Docs are said to be the most pervasive Web 3.0 platforms used among students and teachers as well. On the one hand, in terms of usage patterns, the results have revealed that students are using Web 3.0 more than their instructors. The latter, on the other hand, are using Web 3.0 far more often for educational purposes compared to students. Thus, apart from a few suggestions made by some university students (in the

interviews) about the ways in which Web 3.0 Apps could enhance students' SDL and encouraging mainly shy and introvert students, most of their actual use of the Web 3.0 is restricted to entertainment rather than educational goals.

Despite the various educational benefits associated with Web 3.0 technologies, the findings show that just a small number of respondents use a few apps in classroom activities. This implies that Moroccan university teachers are still reluctant to incorporate Web 3.0 in their teaching pedagogies, which is approved through the respondents in second sequence of this study. Unlike previous findings of Hur, Shen, Kale, and Cullen (2015), the current outcome implies that some teachers are still unaware of the beneficial role of incorporating Web 3.0 in the teaching process. Such incorporation, nevertheless, could not be operative unless "it is essential to (re)design teaching and learning activities to optimize mobile learning environments and exploit the unique affordances mobile learning provides" (Brown & Mbat, 2015, p. 118).

While many students expressed their higher satisfaction with the use of Web 3.0 applications, teachers do not often resort to online educational tools. Such outcome reminds the reader to previous studies done by Weyant and Gardner (2010). This might imply that most teachers are still reluctant to the incorporation of Web 3.0, which reminds the reader about other scholars who claim that some teachers are not willing to resort to any technological novelty (Dusick, 1998; Hunt & Bohlin, 1995; Yildirim, 2000), but there are some teachers who do not use Web utilities simply because they lack the institutions' support (Khaloufi & Laabidi, 2017; Chouit, et al., 2017)

To see whether Web 3.0 contributes to the enhancement of university students' SDL, regression analysis was conducted and attests that there is a high significance and that

university students' SDL is really improved thanks to the use of Web 3.0 tools. It is worth noting that questions 7, 8, 9, & 10 (see section two and the Appendices) show clearly that students' SDL elements really undergo an improved shape through the incorporation of Web 3.0. Within the same framework and following the same reasoning, question 3 and 4 in the teachers' questionnaire provide solid bases to what has been found through the students' questionnaire. Deeply rated, the outcome of students' responses through the post-survey in the third sequence approve what has been revealed above in the sense that Web 3.0 Apps contribute to the enhancement of university students' SDL.

4.3. Interpretations elicited through Research Question 3

Research Question 3: Are students and instructors satisfied with the incorporation of Web 3.0 in ILOs?

Overall, satisfaction with the use of Web 3.0 technologies in the learning process has a strong effect on reinforcing the SDL elements as a way to honing ILOs. Such an outcome stands close to other findings which tackle students' and teachers' attitudes to integrating technology (Powell & Lord, 1998; Altun et al., 2005; Mohammad, 2007; Sivropoulou et al., 2009; Amirshokoohi, 2010; Gjalmas & Nikolopoulou, 2010; Nikolopoulou et al., 2010; Kim & Keller, 2011; Chowdhury, 2016; Hopkin et al., 2016; Callingham & Watson, 2017; Papke et al., 2015; Sadaf et al., 2016; Johnson and Howell, 2005). While students' questionnaire reveals that a vast majority of the respondents have positive attitudes towards the use of Web 3.0 technologies, the teachers' questionnaire displays that a great number of participants have a good intention to incorporate Web 3.0 applications in their classrooms' activities.

They also refer positively to the role and benefits of Web 3.0 in the student's SDL and long-life learning. Indeed, the outcome indicates that both teachers and students are convinced that Web 3.0 could contribute to the enhancement of student's SDL such as setting goals, motivation, taking initiative, and being responsible for their learning path. Besides, more than 60% of teachers and more than 80% of students feel at ease with the use of Web 3.0 applications in classroom assignments. However, an important number of the respondents believe that Web 3.0 will not substitute face-to-face instructions.

Within the same framework, previous findings assert that learners positively rate the use of new technologies in the classroom, and consider them as facilitators of learning (Konstantinidis, 2013). As well, Powell and Lord (1998) believe that participants who were exposed to technology simulations have more knowledge and more positive attitudes toward using technology in the learning process. Altun et al.'s (2005) study displays that preservice teachers develop positive attitudes toward using asynchronous communication tools.

With reference to teachers' belief in the incorporation of Web 3.0 Apps to enhance students' SDL, the results of this paper display that a vast majority of both teachers and students expect a positive outcome of working with Web 3.0 during the learning process. This upshot is sustained by prior findings which reveal that most educators defend the educational integration of technology in the classroom activities (Zogheib, 2015; Gialmas & Nikolopoulou, 2010; Shiue, 2007).

Conversely, some studies disagree with the opinion that attitudes and displaying high interest towards technology is sufficient to infer the tangible incorporation of Web 3.0 applications in classroom activities (Shoffner, 2009; Amirshokoohi, 2010, Iwamoto et al., 2017). However, they showed interest in teaching technology inside their future classrooms.

Besides the high satisfaction with the use of Web 3.0 Apps inferred from sequence one and two, there has been a high satisfaction through the researcher's own observations and notes elicited from the third sequence, that prove the effectiveness of the Web 3.0 Apps (mainly Kahoot). For example, some participants expressed their satisfaction towards Kahoot funny interaction. This implies that there are statistically significant differences between the achievement of the experimental group and the control group in favor of the experimental group.

Indeed, the outcome of this study is congruent with similar studies conducted by Sullivan and Pratt (1996) and Chuo (2007) which display that online learning contributes deeply improving language skills. The outcome is also in accordance with the findings of Singman (2012); Komara and Ramdani (2014); Al-Madhi (2015); Shams-Abadi et al.; Yagci (2015); Jones & Stewart (2016); and Khodary (2017). Therefore, the results of the present study along with the findings of these previous studies prove that incorporating Web 3.0 Apps in higher education highly contributes to the enhancement of an autonomous lifelong learning. indeed, Web 3.0 might be fruitful because it facilitates information sharing, ease smooth communication, which encourages university students attain their intended learning outcomes.

In brief, the results, both quantitative and qualitative, generally indicate that Moroccan university students become more SDL thanks to the use of Web 3.0 Apps. This indeed goes hand in hand with previous findings mentioned in the chapter of the review of literature

4.4. Interpretations Elicited through Research Question 4

Q: Are students and instructors ready to use Web 3.0 in the enhancement of SDL as ILO?

As was discussed previously in the conceptual framework chapter, this study utilized the most updated version of the DigCompEdu Model of Web competence (Redecker, 2018) to examine Web 3.0 level of proficiency among Moroccan university students and their instructors.

The study's outcomes imply further validation for the robustness of DigCompEdu model in the Moroccan higher education context as they align strongly with those reported in some prior studies (Marchewka, Liu & Kostiwa, 2007; Salam et al., 2018; Chang et al., 2011; Göğüş et al., 2012; Nassuora, 2012; Chang, 2013). Thus, as was theorized by DigCompEdu, the constructs of use, satisfaction, and competence factors are found to have a strong impact on students' SDL after incorporating Web 3.0 technologies.

More specifically, with regard to the students' sample, the Pearson correlation coefficient revealed a positive and moderately strong relationship between Web 3.0 use, satisfaction, and competence and their SDL with an r of $.493^{**}$, $p < .001$, an $r = .423^{**}$ and $r = .499^{**}$, $p < .001$, and an r of $.493^{**}$, $p < .001$ respectively. In relation to the teachers' sample, the correlation coefficient $r = .508^{**}$, $p < .001$ uncovered a slightly weaker and positive relationship between Web 3.0 use, satisfaction, and competence and their contribution to enhancing students' SDL.

As concerns the perceived level of digital competence, we are confronted with a rather advanced group of teachers: 51% stated to feel fairly confident and 41% to feel very confident

in using digital technologies in the classroom; 41% felt fairly confident and 55% very confident in using digital technologies at home. There were more male participants (62%) than female participants (38%). All teachers were relatively young: (7%) were 21-25 years old, (16%) were 26-30 years old; (14%) were 31-35 years old. (16%) were 36-40 years old; (15%) were 41-45 years old and (32%) older than 45. 42% of teachers had less than 10 years of teaching experience; 30% had between 10 and 15 years of experience as teachers, and 28% with more than 16 or more years of teaching experience. Put differently, we are confronted with a rather experienced group of teachers, with 80% of teachers having more than 3 years of teaching experience, with the mean, median and mode values falling in the group of teachers with 10 to 15 years of experience.

In brief, students with prior exposure to the Web 3.0 Apps (see Sequence three) obviously develop their awareness and competencies in dealing with online learning, which line up with earlier studies conducted on students' use of new technologies (Bradley & Russell, 1997).

Further, to conclude whether there is a statistically significant difference between the pretest and posttest means of the role of Web 3.0 Apps in the enhancement of SDL, a two-tailed paired samples t-test was conducted in SPSS. A mean score of 0.48 with a standard deviation of 14.73 was obtained. The results of the t-test garnered a score of 0.29 at $p = 0.76$ indicating a strong statistical significance difference between the pretest and posttest means of perceived Web 3.0 integration. Therefore, the null hypothesis of equal strength was rejected.

However, different Web 3.0 apps require different competence to use. One application may be mismatched with another. This sort of competence requires educators to become

lifelong Web learners. Educators need to be ready to admit that educational technology is always changing and make a concerted effort to keep up with those changes (Mishra & Koehler, 2008).

In short, competence is necessary if teachers want to integrate Web 3.0 Apps in their classroom activities and create new strategies in teaching. This reminds the reader with Power (2016) when he insists that any novel teaching technology and pedagogical strategy cannot be implemented without the teacher's aptitude and self-assurance.

4.5. Summary of the Responses to Research Questions and Hypothesis

This project empirically addresses the prominence of incorporating Web 3.0 Apps in higher education so as to contribute to enhancing university students' SDL. In so doing, it has clearly stated its aims, provided a comprehensive theoretical background for operationalizing them, adopted validated conceptual frameworks and, most importantly, made use of a solid mixed method triangulation design. The study has indeed sequentially analysed the results obtained from the three sequences. In what remains, an attempt is made to concurrently discuss and reflect on the study's major findings. This chapter provides basic interpretations of the main findings and their implications along with the study's limitations and some recommendations for future research.

Generally speaking, the path analysis results of the three sequences, students' questionnaire, teachers' questionnaire, and post-test questionnaire data show that Moroccan university students' SDL is enhanced through the incorporation of Web 3.0 technologies in their learning process. Apart from demographic items, all factors have positive significance towards the role of Web 3.0 in the enhancement of students' SDL. A high rate of the responses throughout the three sequences praise the role of the incorporation of Web 3.0 in the

enhancement of students' SDL, yet a great number of the participants express anxiety over recurrent move of Web 3.0 applications and instruments. For compatibility, this paper reveals that the Moroccan university EFL students and teachers agree on the usefulness of Web 3.0 technologies asynchronously and synchronously in terms of learning and teaching strategies, and some teachers intend to incorporate Web 3.0 technologies in the teaching process. However, very few teachers are reported to have used Web 3.0 applications in their instruction activities. This reflects how the Moroccan Ministry of Higher Education ignores the educational role of Web 3.0 technologies in the reinforcement of students' SDL.

In short, the outcome from the current research paper reveal that students of the three universities under study are satisfied with the use of Web 3.0 Apps, and their autonomous learning raises. Further, their autonomy as an element of the intended learning outcomes could be achievable thanks to the synchronous and asynchronous Web 3.0 interactivity. However, both students and teachers opt for both online and face-to-face learning.

Chapter Five: implication & recommendations

5. Implications and Recommendations

Though the rate of Web 3.0 from the part of student than that of the teachers, the study reaches the conclusions that teachers' use of few Web 3.0 Apps is more educational than that of students' in the sense that university students are more social interactive than education. Besides, students are supposed to be more active in the academic oriented sphere

5.1. Implication of the Study

A number of significant implications can be inferred through the findings of this original paper with the hope of indorsing novel pedagogies and assuring the quality of teaching at the Moroccan university. Further, the findings of this dissertation divulge gaps in Moroccan university policy of teaching; especially in the three universities under study. Thus, upgrading actions should be taken into account the sooner the better in order to cope with the innovative waves worldwide. Besides, the outcomes revealed that these institutions are still lagging behind in the incorporation of new technologies such as Web 3.0 Apps in the teaching process though informants of the three sequences expressed satisfaction towards learner-instructor interaction via Web 3.0. The results also imply the pedagogical potential Web 3.0 may play in the enhancement of students' SDL and the realization of ILOs and ILO 3.0 as a new Model of teaching.

Educational reform could benefit from this thesis in the sense that it contributes to the realization of ILOs. This gives the floor to students as crucial stakeholder to rise their voice in the metamorphosis of the learning process in the Moroccan university. Nevertheless, ambitious generalizations made education commentators about this generation need more

experimental fieldwork should be conducted before delving more into any potential educational reform (Belfakir, 2017).

As mentioned in the review of the literature, there is a lack of empirical studies about the possible contribution of Web 3.0 Apps in the learning process at the Moroccan university. Very few studies, however, have dealt with Web 3.0 and some infant Web 3.0 Apps in other countries such as Turkey, Saudi Arabia, Korea, and Spain. The findings from this paper are slightly close to those derived from previous studies.

As revealed from the outcomes of this thesis, both students and teacher, regardless of their demographic orientation, seem aware and willing to integrate Web 3.0 technologies in the instruction process. This is, however, with a slight difference between teachers and students in the sense that the formers are less competent than the latter in the usage of Web 3.0. Indeed, university students are equipped with mobile devices and already use some Web 3.0 applications, and teachers will not their integration in class if they are used for learning purposes as Dobbins and Denton (2017) claim.

5.1.1. Implications for Faculty Members

The findings of this study have important implications for teacher and students who intend to use new technologies (especially Web 3.0) in the academic sphere. They should know that Web 3.0 plays a crucial role in education, communication, motivation, goal setting, and so forth. Hence, university teachers need to emphasize positive attitudes and perceptions of the perceived usefulness and ease of use of Web 3.0 technologies among their students.

One pertinent implication is that teachers can use Web 3.0 Apps for formative assessment. The most widely agreed definition is that formative assessment seeks to determine how students are progressing towards a certain learning goal. The overarching goal is to

monitor student learning to provide ongoing feedback. That feedback, in its turn, can be used by teachers to improve their teaching and by students to improve their learning, depending on their individual needs, strengths and weaknesses.

Another practical implication of this study is that EFL teachers are required to provide their students with opportunities to involve Web 3.0 Applications in their academic homework and assignments on a regular basis. However, they need to sensitize them how effectively and efficiently involve such applications. In that, they have to acquire a certain level of Web 3.0 competency. According to (Albion, 2008), “The best way for teachers to learn about Web 2.0 may be through learning with Web 2.0 as authentic practice that can inform their planning and implementation of learning activities” (p. 21). Thus, university teachers are expected to be aware of the importance of Web 3.0 applications in the new pedagogies, and join their students, who are proficient, in learning how to use Web 3.0.

Further, the outcome of this research implies that many students and teachers do not use most recent educational Web 3.0 technologies such as Kahoot, Edmodo, and Webinar. Besides, they do not use the most famous ones like Facebook and YouTube for educational purposes. For teachers’ head of units, the paper’s findings recommend the requirement to comprise Web 3.0 Applications in their teaching methods. (Agir, 2014) also suggests that teachers should be trained to integrate technological tools into their undergraduate courses, so university teachers are urged to make a mind shift to incorporate Web 3.0 tools in everyday instruction.

Indeed, a deficiency in technological acquaintance may deter university teachers from incorporating Web 3.0 applications in their classroom activities. Particularly at the university

level, most educators are experts in content knowledge, but not in technological knowledge (Hoffman, 2015).

5.1.2. Implications for Policy Makers

For quality assurance in higher education, stakeholders and policy makers are invited to enhance transition from a lecture-based format to a problem-solving approach requiring self-directed, small group work (see also Trevitt & Sachse-Åkerlind, 1999 and Ouakrim & Mouaid, 2005). For a better contribution to the quality of higher education, new technological applications must be incorporated into pedagogical curricula, which will help in shifting relations between teachers and students and enhancing teaching approaches (Ennaji, 2013). Such incorporation will also contribute to honing the quality of learning and teaching strategies.

Policymakers may infer a number of relevant recommendations from the outcomes of the current research paper. They are required to establish comprehensive professional development methods focusing on the arrangement of effective teaching training. Such professional strategies should concentrate on ongoing training targeting the necessary skills that could help teachers to make successful integration of Web 3.0 educational purposes (Brown & Fraser, 2006).

Indeed, policymakers should implement regulations to protect students' privacy and safety while using technology at school. An important number of teachers indicate they do not consistently protect sensitive content, such as exams and students' grades.

Moreover, this paper's outcome reveals that incorporating Web 3.0 technologies in classrooms has a number of advantages in the enhancement of students' SDL. Thus, university curricula should include guiding principles of integrating Web 3.0 Apps to enhance students'

self-directed learning as well as to ripen a certain communication among instructors and students.

5.1.3. Implications for School Administrators

Since an overall result of the current paper reveals that students are generally satisfied with the integration of Web 3.0 and most teachers have positive attitudes towards such integration, administrators should encourage teachers to include Web 3.0 applications to communicate with students and facilitate the task of knowledge acquisition. They should increase the teachers' knowledge about educational apps, programs, and Websites that enhance students' SDL through regular workshops and trainings. The university administrators are required to guarantee professional development on how to incorporate Web 3.0 applications in their classroom activities, focusing on collaborative learning and developing students' own learning.

5.2. Recommendations for Future Studies

Subsequent to literature review, previous relevant studies, data collection and analysis, and the outcomes' implications, recommendations for future research become ostensible. Indeed, several recommendations are inferred through the findings of this research. First, future studies are recommended to investigate role of Web 3.0 in the enhancement of the other two basic elements of ILOs: Diversity and Leadership in addition to students' Autonomous learning. This has to be done with a different sample from a different population to grasp different (or similar) results. In addition, authentic use of Web 3.0 applications should be observed. For example, future researchers are advised to scrutinize how Web 3.0 Applications are implemented into different subject matters and classroom activities.

Another recommendation for future researchers is to duplicate the study with students from other departments in other universities to attain more ideas about the benefit of incorporating Web 3.0 Applications in the learning process. Indeed, through this study it has become apparent that further interviews and observations may be necessary to obtain data on the actual uses of the applications. Last, future studies have to compare EFL university students and teachers in the different universities in Morocco and/or different Maghreb countries to infer whether Web 3.0 is used and how it is used in such universities.

Further, some questions are recommended to be considered in future studies:

- Q1- How can institutions support teachers who seem ready to integrate Web 3.0 Applications?
- Q2- Could teachers be evaluated on the basis of their use of technologies?
- Q3- Does the use of technologies make really the teaching better?
- Q4- Are students assessed according to their access rate to Web 3.0 platforms?

5.3. A Road Map to the Enhancement of SDL and Realization of ILOs

ILOs is currently taking an important position among university teachers and policy makers. A Road Map to the Enhancement of SDL and Realization of ILOs would be based on the empowerment of students' SDL. The outcome of this paper implies a number of teaching gaps between vision and practice at the Moroccan university, which prevents the ILOs to be achieved and sustained. Thus, a road map model (see Figure 34 below) is suggested for the evaluation of students' needs and the empowerment of teachers' quality. This road map is to provide Moroccan university policy makers with plans on how to estimate students' self-directed learning needs and sustain the ultimate quality of university teaching strategies in the

actualization of ILOs. This model is a skeleton that can be adapted depending on each pillar of ILOs such as Diversity and Leadership and each institution's overall philosophy.

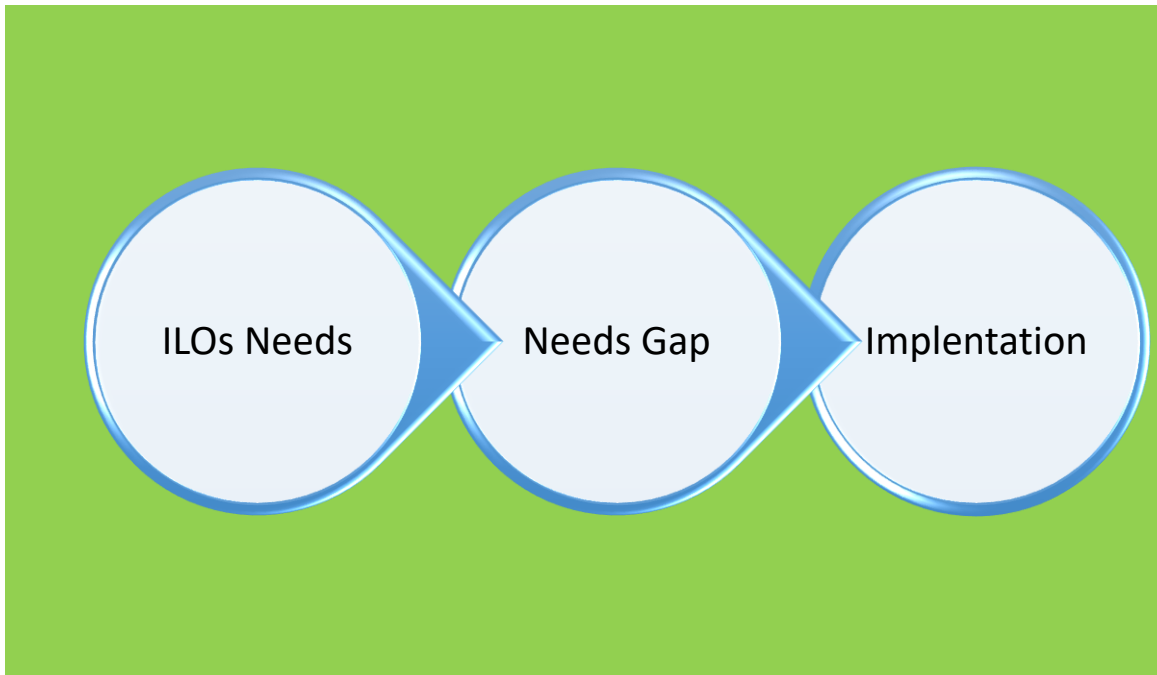
Gap1. The gap between students' needs and teaching strategies, which arises the latter is impotent to cope with the former. While students frequently rely on new technologies and devices, most of their teachers are still lagging behind and do not use and of these technologies in class.

Gap2. The gap between teachers' intention and the institution's equipment, which comes to the surf when a teacher wants to include technologies, yet the institution is reluctant to offer the necessary devices and Internet facilities.

Gap3. The gap between the ILOs' guidelines and the institution's implementation of such guidelines, which occurs the institution does not abide by the 2015-2030 strategic plan.

With the aim of overcoming such gaps, a road map to realize ILOs is suggested. The roadmap has five pillars which are presented in Figure 34. The first pillar stands for the ILOs needs analysis, while the second pillar refers to the gaps found between those needs' expectations and the actual outcome. The third pillar is said to be the implementation of the ILOs guidelines.

Figure 34 ILOs Guideline Road Map



5.4. Limitations of the Research Study

The outcomes of this research paper could be generalized to other universities with similar demographics and populations. The researcher attempts to produce an added value within the norms of scientific investigation; however, the research outcome is not free of some shortcomings and limitations. This study is based only on the responses of Moroccan university EFL teachers and students at three Moroccan universities. Thus, generalizability is limited to students and teachers in similar contexts. Besides, this study comprises very few teachers for the questionnaires is considered as a small sample size. Therefore, the qualitative phase from the questionnaire should be interpreted carefully. While the results prove that satisfaction is a vital predictor of Web 3.0 integration, teachers' attitudes could change in the future after they start using Web 3.0 technologies. Further studies might survey a larger number of university students and teachers and conduct participatory observations in addition

to instructed questionnaires, with the hope of gaining a better understanding of different participants' experiences.

The researcher fused students' answers with teachers' feedbacks concerning open-ended questions and comments in both sequences their answers to get their viewpoint of integrating Web 3.0 applications to enhance students' SDL and discovered that both teachers and students intermingle between Web 3.0 and other technological tools such as PowerPoint and Smart Boards. In short, the limitation to this paper can be traced back to the fact that an unlimited number of new Web 3.0 Applications is spreading swiftly by the time teachers and students who were involved in this project is done.

Another inevitable methodological limitation of this study relates to the adoption of a cross-sectional design and it is therefore necessary to acknowledge the fact that the participants' perceptions of the issues under investigation may change over time and hence the findings may not be generalizable beyond the time the study was carried out. Besides not all participants in the research follow similar coursework.

Further, as technology continues to develop, it is becoming increasingly more difficult to separate between applications' functions when conducting research on these topics. Many applications have a wide variation of proficiencies. It is growing harder and harder to use device categories in research since so many functions can be accomplished across a number of technology platforms.

General Conclusion

Recently, SDL has been getting much thought among scholars and is being recognized as a substantial concept for higher education in an everlasting moving globe (Guglielmino 2013). SDL is characterized as the key element for a sustainable successful learning (Hopkins et al., 2010 and Du Toit-Brits & Van Zyl, 2017), which is the allure of motivating students to retain active learning (Mulube and Jooste 2014).

Therefore, enhancing university students' SDL becomes a crucial ambition of higher education policy makers (Du Toit-Brits, 2018) , which contributes to paving the way the ILOs to become true. Hence, this thesis recommends the incorporation of Web 3. 0 applications to facilitate the fulfilment of such ambition. “When students possess self-directed characteristics, they will be capable of managing their educational needs in such a manner that it can lead to lifelong learning” (Du Toit-Brits & Van Zyl, 2017, p. 122)

Today, the way students learn and connect with others has known a dramatic metamorphosis. What students know and how they know it is no longer something that is only obtained from sitting in a classroom or reading out of a textbook. The gathering of information has become more accessible and instantaneous thanks to Web 3.0 technologies. Rather than going to library, students can get answers within seconds on their own devices, which contributes to developing their self-directed learners.

Web 3.0, as a semantic Web, is shifting the way students and teachers communicate, and hence university teachers should be aware of its educational impact. Indeed, Web 3.0 becomes more and more ubiquitous among university students, yet it has not found its way to educational landscape.

Web 3.0 has become pervasive; university students have found ways to cope with recent Web 3.0 technologies for many purposes. The rate at which they are using such technologies has been increasing progressively and alluring pedagogical approaches to use Web 3.0 in higher education is necessary. It is thus useful to examine how university students are currently using Web 3.0 Apps, and how their teachers could incorporate those Apps efficiently and effectively with the hope of actualizing the intended learning outcomes.

So far, no research has explored the importance of incorporating Web 3.0 applications for the enhancement of university students' SDL as an element of ILOs. This thesis contributes to infer the ways in which university students and teachers use new technologies for academic purposes may help educators better decipher when and how to integrate Web 3.0 approaches into their class activities appropriately. The current research study addressed the tools to which students and instructors had access and how they used their devices to facilitate their education in and outside of class.

This thesis explores the incorporation of Web 3.0 software in higher education with the aim of enhancing students' self-directed learning as a component of the university Intended Learning Outcomes. For this purpose, a sequential exploratory mixed-method is used. The first sequence is an online questionnaire administered to students from three Moroccan universities, the second sequence is an online questionnaire administered to teachers from the same institutions, and the third sequence is an experience of teaching with Kahoot as a Web 3.0 App.

Interestingly, the paper demonstrates the way how data has been collected and analyzed. The thesis has been conducted following a nonprobability convenience sampling with a sequential exploratory mixed-method. The final participant population is $N = 674$

students and teachers from three Moroccan universities (SMBAU, MIU, AUI). 580 students, 45 teachers, and 49 focused group students. The instrument chosen for this study is the DigCompEdu Scale, developed by Redecker (2018).

The results of this study may help researchers and educators use Web 3.0 Model as a guiding construct to enhance Self-Directed Learning (SDL) as a crucial pillar of Intended Learning Outcomes (ILOs). Web 3.0 Applications have become significant educational tools at the university level in different parts of the world, but most Moroccan universities are still lagging behind. It is clear that the effective use of these new technologies relies on students' readiness and teachers' competence. In other words, successful incorporation of Web 3.0 in the teaching process cannot be achieved without teachers' training and workshops in how and why to use Web 3.0. Such trainings can be encouraged by the institutions as well as through teacher initiatives.

Means, standard deviations and significances have been found through data analysis among the three sequences. These statistical data contribute to describing students' and teachers' awareness of Web 3.0 tools, frequency of Web 3.0 use, their satisfactions with Web 3.0 interactivity as well as their level of proficiency in the integration of Web 3.0 applications in the educational setting. Descriptive statistics confirm that there exists a positive impact of Web 3.0 apps in the three sequences. Detailed tables, graphs, and explanations of the data collected throughout the surveys in the three sequences have been presented in the body of the thesis highlighting insights from university students and teachers regarding Web 3.0's role in the enrichment of the SDL as an element of the ILOs.

According to the findings of this paper, there are significant differences between respondents' integration of the new technologies based on awareness, satisfaction, and

competence. In fact, knowledgeable teachers in Web 3.0 tend to include new apps in enhancing students' SDL more frequently than teachers with no knowledge or basic knowledge. It is possible to conclude that awareness and competence might be strong factors of the potential incorporation of Web 3.0 technologies in classroom activities.

These statistics aid in the description of students' and teachers' awareness of Web 3.0 tools, frequency of Web 3.0 use, their satisfactions with Web 3.0 interactivity, and their level of proficiency in integrating in the educational setting. Descriptive statistics confirm that there exists a positive impact of Web 3.0 apps in the three sequences.

Remarkably, the data gathered throughout the three sequences (students' questionnaire, teachers' questionnaire, and post-test questionnaire) reveal that the incorporation of Web 3.0 applications in the learning process may contribute to empowering Moroccan university students' SDL. Aside from demographic items, every factor construct has displayed positive correlational significance with the role of Web 3.0 in the enhancement of students' SDL. Besides, the high rate of the feedbacks through the three sequences praise the role of the integration of Web 3.0 in the enhancement of students' SDL, yet an important number of the participants express their anxiety over the frequent move of Web 3.0 technologies and tools.

Further, the thesis offers explanation that Moroccan university EFL students and teachers agree on the usefulness of Web 3.0 technologies asynchronously and synchronously in terms of learning and teaching strategies, and some teachers intend to incorporate Web 3.0 technologies in the teaching process. However, very few teachers are reported to have used Web 3.0 applications in their instruction activities. This reflects how the Moroccan Ministry

of Higher Education ignores the educational role of Web 3.0 technologies in the reinforcement of students' SDL.

Based on the results of this study, the following recommendations can be suggested. Innovative workshops should be provided on a regular basis to sensitize teachers to the importance of Web 3.0 and help them understand when and how to use Web 3.0 Apps asynchronously and synchronously. As well, convenient technical infrastructure and availability of Internet and novel software should be offered at the university. Besides, it is strongly recommended that administrators need to provide programs that aim at developing the Web 3.0 skills to meet the teacher and student needs. Finally, policy makers need to become better informed about the various factors that hinder the effective and successful implementation of Web 3.0 applications within the framework of classroom activities.

However, how would teachers incorporate Web 3.0 technologies if they do not get the support from their institutions and are not evaluated on the basis of their use of such technologies? How can institutions reinforce the implementation of new technologies? Does the use of technologies make really the teaching better? if institutions do not provide teachers with the adequate training to update their content simultaneously with using technologies, why teachers do bother to change their ancestral methods?

Therefore, "there is a need to prepare and support [teachers] to meet the pedagogical and technological development requirements of their target audience most effectively and efficiently" (Dabbagh & Fake, 2017, p. 393). The global education is shifting, and technology is omnipresent; it cannot be avoided. Teaching without technology is no longer an acceptable practice. Yet, Web 3.0 will never substitute teachers, but it would rather bring fresh blood to revive quality assurance in higher education.

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Appendix A

Student Questionnaire

Would you please spare a few minutes to fill out this questionnaire? I value your participation in this survey (about Moroccan universities). I would like to know more about your awareness and satisfaction to the use of new technologies (Web 3.0) in your academic learning process as well as your perceptions of the benefits of using Web 3.0 on the enhancement of your autonomous learning. Please answer the questions as they relate to you. This survey will probably take you about 10 minutes to complete. Please read each question carefully and answer as best you can. There are no right or wrong answers. For more answers, check the box(es) most applicable to you. Please note that your answers are confidential, and your participation remains anonymous. Thank you very much in advance.

1. 1-Please indicate your age group

Mark only one oval.

- 18-21 years
- 22-24 years
- 25-29 years
- 30 years-more

2. 2-Please indicate your gender

Mark only one oval.

- Female
- Male
- Other:

3. 3-Please indicate your home

university *Mark only one oval.*

- Sidi Mohamed Ben Abdellah University, Fes
- Moulay Ismail University, Meknes

- Al Akhawyn University, Ifrane

4 4-Please indicate your current semester of study *Check all that apply.*

- Freshman (first year)
- Sophomore (second year)
- Junior
- Senior
- Master
- Other:

5. 5-Do you have the following mobile devices? *Mark only one oval per row.*

Yes

No

Personal Computer

Tablet

Smart Phone

Smart Watch

Personal Computer

Tablet

Smart Phone

Smart Watch

6. 6-How often do you have a mobile device with you at school?

Mark only one oval.

1

2

3

4

5

Never

Always

7. 7-Do you have Internet access? *Check all that apply.*

- Yes
- No

8. **8-Where do you use Internet?** *Check all that apply.*

- Home
- School
- Library
- Cafe
- Mobile Phone
- Cyber
- Other:

9 **9-How often do you use Internet per day?**

Mark only one oval.

- very frequently
- frequently
- occasionally
- rarely
- very rarely
- never

10. **10-How often do you use Internet in class?** *Mark only one oval.*

- very frequently
- frequently
- occasionally
- rarely
- very rarely
- never

11. **11-Which of the following Web 3.0 Apps are you familiar with?**

Mark only one oval per row.

Yes

No

BookWidget

Coursera

Edmodo
 Edublogs
 Facebook
 Google Docs
 Kahoot
 Webinar
 WhatsApp
 YouTube
 BookWidget
 Coursera
 Edmodo
 Edublogs
 Facebook
 Google Docs
 Kahoot
 Webinar
 WhatsApp
 YouTube

12. 12-Please indicate your knowledge level of competence in the following Web 3.0 Apps *Mark only one oval per row.*

- No knowledge
- Basic concepts
- Competent
- Proficient
- I don't know

BookWidgets
 Coursera
 Edmodo
 Edublogs

Facebook
Google Docs
Kahoot
Webinar
WhatsApp
YouTube
BookWidgets
Coursera
Edmodo
Edublogs
Facebook
Google Docs
Kahoot
Webinar
WhatsApp
YouTube

13 13-Please indicate your level of agreement as to the usage of Web 3.0 Apps

Mark only one oval per row.

	Strongly Agree	Agree	I don't know	Disagree	Strongly Disagree
Web 3.0 helps me to manage my time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web 3.0 helps me to feel more motivated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web 3.0 helps me to be more organized	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web 3.0 helps me to learn quickly and easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web 3.0 helps me to prioritize my work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web 3.0 helps me to set my learning goals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web 3.0 helps me to enjoy learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web 3.0 helps me to feel more responsible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web 3.0 helps me to take initiative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web 3.0 helps me to participate more	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web 3.0 helps me to prepare well for my exams	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. **14-Please select your preferences for learning style** *Mark only one oval.*

- Face-to-Face Learning
- Online Learning
- Both
- I don't know

15. **15-How do you rate the frequency of your learning interaction through Web 3.0 Apps?** *Check all that apply.*

- All of them
- Most of them
- Some of them
- None of them

- My teachers include Web 3.0 in class activities
- My teachers upload (put) tasks / assignments online
- My teachers assign (put) handouts / homework online

My teachers assign (organize) quizzes / exams online
 My teachers discuss activities with class online
 My teachers use email to communicate with the class
 My teachers chat with class via social media
 My teachers include Web 3.0 in class activities
 My teachers upload (put) tasks / assignments online
 My teachers assign (put) handouts / homework online
 My teachers assign (organize) quizzes / exams online
 My teachers discuss activities with class online
 My teachers use email to communicate with the class

My teachers chat with class via social media

16 16-Please indicate your level of satisfaction with Web 3.0

Mark only one oval per row.

Highly satisfied

Satisfied

Indifferent

Unsatisfied

Highly unsatisfied

Web 3.0 helps me download files
 Web 3.0 helps me upload files
 Web 3.0 helps me browse apps and games
 Web 3.0 helps me deliver a live broadcast
 Web 3.0 helps me download files
 Web 3.0 helps me upload files
 Web 3.0 helps me browse apps and games
 Web 3.0 helps me deliver a live broadcast

17. 17-Please indicate your level of agreement with the use of Web 3.0 Apps in your learning process

Mark only one oval.

1 2 3 4 5

Very Not useful at all

18. 18-Do you think that Web 3.0 may substitute (replace) face-to-face learning? *Mark only one oval.*

1 2 3 4 5

Strongly Agree Strongly Disagree

19. 19-Please insert any comment or suggestion

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Appendix B

Teacher Questionnaire

Would you mind filling out this academic questionnaire? This survey will allow the researcher to get a very first idea of your level of digital pedagogic competence. The answer options are organized by increasing level of competence. Please remember that this is a tool for self-reflection and learning, and it remains anonymous. Thank you very much in advance for your cooperation.

* Required

1. **1-Please indicate your gender** * *Mark only one oval.*

- Female
 Male

2. **2-Please indicate your age group** * *Mark only one oval.*

- 25-29 years old
 30-34 years old
 35-39 years old
 40-44 years old
 45-49 years old
 50-54 years old
 55-More years old

3. **3-Please indicate your university of affiliation** * *Mark only one oval.*

- Sidi Mohamed BenAbdellah
 Moulay Ismail University
 Al Akhawayn University

4. **3-Please indicate your teaching experience** * *Mark only one oval.*

- 0-3 years
- 4-6 years
- 7-9 years
- 10-15 years
- 16-20 years
- More than 20 years

5 **4-Do you have the following device?** * *Mark only one oval per row.*

Yes

No

Personal Computer

Tablet

Smart Phone

Smart Watch

Personal Computer

Tablet

Smart Phone

Smart Watch

6. **5-Do you use different online communication tools for different purposes. e.g. E-mail with students; Facebook for general audience; Apps for students' groups, WhatsApp with colleagues...?** * *Mark only one oval.*

- Not at all: I do not use digital communication channels
- Not really: I use the same digital communication channel for everything
- Sometimes I vary communication channels
- Yes, I respect students' preferences
- Yes, I strategically choose between different digital options

7. **6-Do you use online technologies to work together with colleagues inside and outside your institution?** * *Mark only one oval.*

Not at all: I do not use digital technologies to collaborate with colleagues

- Not really: I only use digital technologies to collaborate with teachers inside my school
- Sometimes I exchange materials with colleagues inside and outside my school, e.g. via e-
- Yes, I frequently exchange ideas and materials, also with teachers outside my school, e.g. in an online teacher network
- Yes, I jointly create materials with other teachers in an online network of teachers from different organisations

8. 7-Do you continuously reflect on how you can improve your use of new technologies in teaching and learning * *Mark only one oval.*

- No, never: I do not use digital technologies in teaching
- No, rarely: I do not usually reflect on how to improve my use of digital technologies in teaching
- Sometimes, but not continuously
- Yes, reflection is part of my daily practice
- Yes, all the time, and I frequently participate in targeted training

9. 8-Do you participate in online training opportunities e.g. online courses, MOOCs, Webinars, virtual conferences... * *Mark only one oval.*

- No, never
- Not yet, but I am interested
- Somewhat, once or twice
- Yes: I have tried out various different online training opportunities
- Yes, all the time: I frequently participate in all kinds of online training

10 9-Do you use different internet sites and search strategies to find and select online resources e.g. using educational platforms and repositories or online professional networks to identify suitable worksheets, presentations, videos, pictures, games, quizzes, apps, sites to set up blogs,wikis...? * *Mark only one oval.*

- Not at all: I do not use the internet much
 Not really: I search the internet
 Somewhat: I know different Websites with educational resources and use them
 and every now

 Yes, I frequently use different repositories with educational resources
 Yes, I strategically select between the very many different repositories I know

11. 10-Do you create your own digital resources and modify existing ones to adapt them to your needs. e.g. you create presentations, digital worksheets, videos, blogs, online quizzes; you adapt digital quizzes or worksheets, adjust programs and apps, embed videos...? *

Mark only one oval.

- Not at all: I do not create digital resources
 Not really: I do create worksheets with a computer, but then I print them
 Somewhat: I create worksheets and presentations, but not much more
 Yes: I create and modify different types of resources
 Yes, all the time: It is part of my daily practice to create and modify different types of digital resources

12. 11-Do you effectively protect sensitive content, e.g. exams, students' grades? * Mark

only one oval.

- Not at all: I don't really worry
 Not consistently
 Somewhat: the school takes care of this
 Yes, I password protect these files
 Yes, I comprehensively protect these files (example: combining hard-to-guess passwords with encryption and frequent software updates)

13. 12-Do you carefully consider how, when and why to use digital technologies in class, to ensure that they are used with added value? * Mark only one oval.

- Not at all: I do not use technology in class
- Not really: I use the digital whiteboard to explain new concepts, that's all
- Somewhat: I make sure that my presentation is understandable and interesting
- Yes, I also use digital technologies to support individual and group work
- Yes, for each phase of the lesson I have some fun activity ready

14 13-Do you monitor learners' behavior and engagement in the collaborative digital environments you use? * Mark only one oval.

- Not at all: I do not use digital environments with my learners
- Not really: I do not monitor students' behaviour
- Sometimes I check on them
- Yes, I regularly check on them
- Yes, I regularly intervene with motivating or corrective comments

15. 14-When your students work in groups or teams, do they use digital technologies to generate and document evidence? * Mark only one oval.

- Not at all: My learners do not work in groups
- Not really: My learners do not use digital technologies in group work
- Sometimes they use the internet to find information or present their results in digital format
- Yes, they often use the internet to find information and present their results in digital

Yes, extensively: They exchange evidence and jointly create knowledge in a collaborative online space where I can monitor their progress

16. 15-Do you use new technologies to allow learners to monitor their learning themselves (Example : using quizzes or surveys for self-assessment, ePortfolios for showcasing, online diaries for reflection...)? * Mark only one oval.

- Not at all: My learners do not monitor their own learning
- Not really: My learners monitor their own learning, but not with digital technologies
- Sometimes I use quizzes for self-assessment
- Yes, I use different digital tools for learners to monitor their learning
- Yes, I follow a structured approach integrating different digital tools to allow learners to monitor and reflect on their progress

17. **16-Do you use online assessment formats to monitor student progress?** * *Mark only one oval.*

- Not at all: I do not regularly check on student progress
- Not really: I do not use digital tests to check on progress
- Sometimes I use online tests to see where students stand
- Yes, I regularly check on student progress using little tests or quizzes
- Yes, all the time, also to understand where I need to improve my teaching

18 **17-Do you reflect on the digital and non-digital evidence you have on learners' behavior and progress to better understand individual problems?** * *Mark only one oval.*

- Not at all: Learners' behaviour is none of my business
- No: This "evidence" is not available to me
- Sometimes, e.g. at the end of the term or period of study, to identify students who need
- Yes, I watch out for changes in behavioural patterns on a weekly basis

Yes, on a weekly basis, I identify and discuss changes in behavioural patterns with students

19. **18-Do you use digital technologies to provide effective feedback and help students understand their learning needs?** * *Mark only one oval.*

- Not at all: There is no need to involve students
- Not really: Digital solutions are not an adequate response
- Periodically, after each term or period of study
- Yes, frequently: This is part of my daily practice
- Yes, strategically: On a daily basis, and we also discuss which digital solutions work well and which don't

20. **19-When you create digital assignments for learners, do you consider and address problems they may have with the digital format (Example: lack of access to digital devices or internet, interoperability and conversion problems when using**

PCs/tablets/smartphones, learners' lack of digital competence, unequal access to e.g. email, facebook, google docs, WhatsApp? * *Mark only one oval.*

- Not at all: I do not create digital assignments
- Not really: My students don't face these problems
- Yes, by minimizing problems: I adapt the task so as to minimize problems
- Yes, by enabling students: I discuss possible obstacles with students and outline solutions

Yes, by allowing for variety: I adapt the task, discuss solutions and provide alternative ways for completing the task

21. 20-Do you use new technologies to provide your students personalized learning opportunities (e.g. you give different students different digital tasks to address individual learning needs, preferences and interests)? * Mark only one oval.

- Not at all: All learners get to do the same activities, irrespective of their level
- Not really: I provide learners with different activities, but use non-digital formats
- Yes, for some: I provide digital activities for those who are advanced or lagging behind
- Yes, by level: Different ability groups get different digital tasks
- Yes, for each and every student: I provide each student with a set of digital tasks tailored to individual learning needs

22 21-Do you use digital technologies to more actively involve learners? *

Mark only one oval.

- Not at all: My students do not use digital technologies
- Not really: I do involve students actively, but not with digital technologies
- Yes, when instructing, i use motivating stimuli: videos, animations , cartoon,...
- Yes, My students regularly engage themselves with digital medias, e.g. electronic worksheets, games and quizzes
- Yes, all the time: My teaching is based on students' active involvement with digital technologies, e.g. they play games or quizzes, they create digital content or solve problems using digital tools

23. 22-Do you teach learners how to check if information is reliable and to identify fake news?

*

Mark only one oval.

- Not at all: This is not relevant in my subject
- Not really: It is not my responsibility to teach this
- Yes, I teach them about reliable and unreliable sources
- Yes, I discuss with students how to verify the accuracy of information
- Yes, comprehensively: we discuss how information is generated and can be distorted

24. 23-Do you set up assignments which require learners to use online technologies means to communicate with each other or with an outside audience? * Mark only one oval.

- Not at all: I do not use assignments that require communication
- Not really: In my subject this does not make sense
- Partly: to communicate with each other
- Yes, to communicate internally and externally
- Yes, in a structured way allowing them to slowly expand their skills

25. 24-Do you set up assignments which require learners to create digital content (e.g. videos, audios, photos, digital presentations, blogs, wikis...)? * Mark only one oval.

- Not at all: My students do not create content
- Not really: Not all of them have the necessary access to digital technologies
- Sometimes, as a fun activity
- Yes, as integral part of their study
- Yes, strategically: As integral part of their study and with increasing level of difficulty

26. 25-Do you teach learners how to behave safely and responsibly online? * Mark only one oval.

- Not necessary: If at all, my students only use safe environments
- Not really: It is not my responsibility to teach this
- Yes, I explain existing rules of conduct
- Yes, we discuss and agree on rules of conduct
- Yes, strategically: My students practically apply existing and commonly agreed rules in the different digital environments we use

27 26-Do you encourage learners to use digital technologies creatively to solve concrete problems? *

Mark only one oval.

- Not at all: This is too difficult for them
 - Not really: It is not my responsibility to teach this
 - Occasionally, whenever an opportunity arises
 - Yes, we often experiment with technological solutions to problems
 - Yes, strategically: I purposefully integrate opportunities for creatively using digital technologies into the subject learning
-

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