Challenge Based Learning: Measuring CBL and the potential for change at higher educational institutions

A survey from the perspective of course and module coordinators at the UTwente

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Abstract

The world faces various global challenges of economic and business nature, innovation and change in education is required. Therefore, innovative educational practices such as CBL gain importance to be implemented in higher educational institutions. However, there is a research gap due to the lack of an instrument throughout the literature that measures CBL at higher educational institutions. So, this paper comes up with an initial attempt for a survey instrument measuring CBL readiness and the potential for change in existing curricula across many disciplines. To measure this, UTwente serves as a case to apply the online survey and 72 responses of course/module coordinators are collected to attain a comparison between the current and potential state. The paper concludes that from the perspective of course/module coordinators 1) in the current state the ITC faculty, the 'master' study program use most of the CBL components. The overall use of CBL components is 'slight to moderate', 2) while in the potential state, there is 'moderate' readiness and openness towards change. The CBL component 'enterprise skills', faculty EEMCS and the 'bachelor' score the lowest showing the most potential for change. The results also revealed that there is less openness towards changing the teacher role indicating that this issue needs to be tackled. So, more work can be done towards exploiting the potential to implement CBL in the future. This paper emphasizes the importance for all higher educational institutions to measure both states to have an overview, restructure the curriculum and tackle issues towards change.

Abbreviations used throughout the whole document:

1. Challenge based Learning: CBL
2. University of Twente: UTwente

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1. Background & Problem Definition

1.1 Background and Relevance

The world faces global challenges and uncertainty more than ever before. A global crisis, upcoming digital technologies, the global pandemic occupies everyone's mind, from governments to small companies and each one of us across the world (Etemad, 2020). Due to the world facing all kind of economic and business challenges, the specific skills development and knowledge of upcoming graduates are needed to change accordingly. Therefore, education needs to adapt to the turbulent and rapidly changing environment. This requires educational change involving the change of curriculum materials, technologies, resources (Fullan,2007), learning methods, teacher's mindset and learning environments used (Burner, 2018). To tackle this issue, *Challenge based learning (CBL)* and *education innovation* are topics which gain importance and attention from various organizations, institutions of higher education and governments all over the world. Furthermore, also according to the European University Association (EUA) (2018), there is an increasing trend towards the demand for universities to focus on the student's learning process and their success (EUA, 2018). So, the student-centred (student-led) learning approach is the necessary pedagogical approach and effective education provision is student-centred (Bransford et al., 1999). This makes the need for innovative educational practices such as CBL essential. However, the execution of the student-centred approach in practice looks different because it requires change of the mindset, behaviour, attitude, and culture (Thurlings et al., 2015). According to O'Neill et al. (2005), one can find that there is a difference between what the person understands and perceives as the definition of student-centred learning at the higher educational institution, and how it is finally practiced or executed (O'Neill et al., 2005). So, a gap occurs between the ideology of teaching approaches and the reality of execution (Sabah & Du, 2018). Therefore, it is important to have a clear definition of the teaching approaches and a clear policy for how to implement it (Attard et al., 2010). Subsequently, this contributes to innovation in education which is essential for the 21st century higher educational institutions (Martinez & Crusat, 2017). However, to implement innovation in higher educational institutions, it is necessary first and foremost to measure how innovative the curricula across the institutions are and to identify how much potential for change there is. Subsequently, one can find a research gap in here because there is barely any literature that introduces an instrument or framework to measure innovative educational practices such as CBL at higher educational institutions. Therefore, the focus of this study will be on developing a (survey) instrument to measure innovativeness (CBL) and the potential for change explored and explained by the case of the University of Twente.

There are numerous papers dedicated to education innovation (Roberts and Owen, 2012; Thurlings et al., 2015). Challenge based learning is a (teaching) methodology to introduce innovation in education (Martinez & Crusat, 2017). However, there are a few papers on the topic of Challenge based learning in the context of higher education (i.e., Guidelines of implementing CBL; examples from universities

(Chalmers University, VanTH) etc.). This is due to CBL being a relatively new approach applied and experimented with at higher educational institutions (Tecnológico de Monterrey, 2015; Malmqvist, Rådberg, and Lundqvist, 2015). Although CBL is already applied in primary and secondary education it is not that much implemented and a common practice in higher educational institutions (Gaskins et al., 2015). CBL is referred to as the "new trend" in higher educational institutions. Regardless of its promise, there is a lack of standardization to define the CBL approach throughout the literature and there are discussions about the pedagogical heritage of CBL (Gallagher & Savage, 2020). Additionally, throughout the literature the term CBL is interchangeably used with problem-based learning or project-based learning. Some research papers say that CBL is built upon problem-based learning or project-based learning, and that these are predecessors of the CBL approach (Rådberg et al., 2020; Nichols and Cator, 2008). Other papers mention that although CBL shares common elements and features with already existing pedagogical approaches, CBL imminently differs from these and should be acknowledged as an approach of its own (Binder et al., 2017; Garay-Rondero et al., 2019; Membrillo-Hernández et al., 2018; Dobber et al, 2017). So, there is still confusion in this research area.

Nonetheless, although many papers use numerous frameworks, educational interventions, and hybrid approaches to explain CBL, one could find a definition for the CBL approach throughout the literature (Gallagher & Savage, 2020). According to Malmqvist et al. (2015) "Challenge-based learning takes place through the *identification*, *analysis* and *design* of a *solution to a sociotechnical problem*. The learning experience is typically *multidisciplinary*, involves *different stakeholder perspectives*, and aims to find a *collaboratively developed solution*, which is *environmentally, socially and economically sustainable*"(Malmqvist et al, 2015, p.87). In addition to the definition, throughout the literature there are two versions of conceptual frameworks of the CBL approach. First, the STAR Legacy Cycle (Appendix B: Figure 4) which was used first and foremost at the Vanderbilt University. (Brophy et al., 2001). Second, the Apple Inc. Challenge based learning framework (Appendix B: Figure 2) which emerged from the "Apple Classrooms of Tomorrow—Today" (ACOT2) project that aimed to point out the most critical design principles of a learning environment in the 21st century (Nichols and Cator, 2008). Moreover, this CBL framework consists of the following three main stages: 1) engage, 2) act and 3) investigate. So, by going through those stages, teachers, students, industry, and other stakeholders collaboratively learn and come up with solutions to real world issues/problems and act upon these. Additionally, students are encouraged to reflect upon their learning process and are asked to present the solutions to a broad/world audience (Apple Inc., 2011). From the latter mentioned CBL approach, a variety of research papers appeared of how to enhance the development of student's 21st century skills (Cheng, 2016), various guidelines and examples of how to implement CBL at higher educational institutions, universities and papers introducing hybrid approaches (Binder et al., 2017; Gaskins et al., 2015; Johnson & Brown, 2011). So, all in all, the Apple Inc. CBL framework is used more frequently due to being more detailed and extended to support the implementation of CBL.

1.2 Problem Definition and Purpose of the study

A preliminary literature review reveals that there is still a mismatch between the intended teaching approach (intended curriculum) and the ultimate execution in practice of large-scale educational innovations (Rogan, 2007; Bantwini, 2010). Especially, for the implementation of the CBL approach, higher educational institutions face confusion on what CBL is and how to apply it (Gallagher & Savage, 2020). This is mainly due to the scarcity of definitional clarity for CBL, and the existence of a broad array of frameworks or examples applied at various institutions (Tecnológico de Monterrey, 2015; Malmqvist et al., 2015). So, there is less research conducted on CBL in higher educational institutions and how to integrate it successfully and strategically into educational programmes/curriculum. This is because there is not a CBL approach that is a "one size fits all" solution for all educational institutions. This makes the adoption and implementation of CBL across the higher educational institutions a challenge. However, a way to overcome those challenges is to innovate the educational curriculum and for all stakeholders, especially the educators, to be open for change and learn something new (Franco et al., 2019). In general, it is important to overcome the resistance to change (Félix-Herrán et al., 2019). So, to tackle those issues, one needs to measure innovation at the higher educational institutions to identify the problems and the potential for change.

In consequence, the UTwente will be used as the study context for this paper. In November 2019, with the launch of the European Consortium of Innovative Universities (ECIU) university, CBL found its way to become an interesting thing at the UTwente (Utwente, 2019). So, although the UTwente is constantly busy with innovation in education and change, it becomes important for the University to develop and explore further opportunities in the field of innovative teaching approaches such as CBL. However, despite the introduction of some initiatives and programs such as the pilot project "InGenious", the EICU university, the Designlab, CELT expertise, extracurricular minor or master program/elective and the 4TU.CEE, these are still trials and work in progress. Moreover, for the Utwente it is also a challenge to integrate CBL throughout the curricula across the university due to the current educational teaching approaches in use and the accreditation (allocation of study points). All in all, this study will illustrate if CBL is present across the courses and modules across the UTwente and if there is a potential or room for implementing CBL. So, this study will show the current state of CBL across the courses/modules and if the courses/modules are CBL eligible from the perspective of course/module coordinators.

The purpose of the study is to deepen the knowledge of CBL readiness and the potential for change with a survey to apply in existing curricula across many disciplines. The study will lead to identify and better understand current educational teaching methods used by institutions of higher education. Especially for the case of UTwente, it is necessary to look at the current state of the courses/modules, to identify if these already entail elements of the CBL approach and if these have the potential to apply CBL.

During this study, an initial literature review is conducted revealing innovative educational practices such as the CBL approach (Apple Inc., 2011), and a framework for curriculum design (van den Akker et al., 2003). Moreover, the main part of this study entails coming up with an instrument to conduct an online survey with the UTwente course and module coordinators. Furthermore, this study undertakes a statistical analysis of the survey responses which entails a comparison between the current and potential state.

So, the ultimate practical contribution of this study is the provision of an initial template for a (survey) instrument to measure and assess the CBL teaching approach across the educational programs and the potential for change (CBL) at higher educational institutions. This subsequently, can stimulate further actions required to adjust and modify the current educational curriculum across higher educational institutions, in this case for the UTwente.

1.2.1. Research Question and Sub-questions

To obtain further new insights into the field of Challenge based learning for the case of the University of Twente, I came up with the following research question (sub-questions). The research question entails two parts.

Research Questions:

1) ***To what extent is the CBL approach already implemented across the courses/modules at the UTwente from the perspective of course/module coordinators? (The status quo)***
2) ***And do the courses/modules have the potential for change to implement CBL from the perspective of course/module coordinators, while respecting the PILOs (Programme Intended Learning Outcomes), for the next academic year (2020-2021)?***

Sub-questions:

1.1 What is CBL and what are the core CBL components compared to other innovative educational practices e.g., problem-based learning?

1.2 How can you measure innovation and the potential for change at higher educational institutions?

1.3 Which frameworks do exist to understand educational innovation from a program/institutional level?

1.4 Do educational quality indicators exist?

1.2.2. Research objectives

Research objectives describe the actions I need to undertake to reach the aim of my research study.

Overall research objective:

- The development and design of a survey instrument that measures the CBL readiness and the potential for change in existing curricula across various disciplines.

Specific research objectives:

- To identify the CBL components currently used and whether these have the potential in the future to be used throughout the courses/modules.
- To draw a comparison of the current vs the potential state regarding the use of CBL components (comparison of averages).
- To identify variables with the highest and lowest use of the CBL components.
- To identify variables with the highest and lowest potential for change.

2. Theory

This chapter provides answers to the above-mentioned sub-questions in chapter 1: Introduction. Therefore, this chapter entails a literature review to explore and identify theories or concepts about innovation in higher education, the definition of CBL, the CBL components (principles), and the curriculum design (curriculum spider web) which will be used throughout this paper. It is necessary to undertake a literature review to identify the current state of knowledge regarding the research topic. More specifically, each section of this chapter reveals core literature regarding the following issues: 1) What is CBL and what are the key differences with associated educational frameworks (i.e., problem based/project-based learning)? 2)What are the core components (principles) of CBL. 3) How can the presence of these core components (principles) be assessed in existing study units such as courses/modules. 4) Which educational quality indicators exist? Subsequently, this enables us to come up with a (normative) framework for a survey, to conduct the analysis and to finally make recommendations.

2.1 Introduction to innovation in higher education and CBL components as indicators for innovation

CBL provides a framework (Nichols and Cator, 2008) that can be used as a foundation from which innovation in education can derive. There are two different types of innovation (Christensen et al., 2013). First, the *sustaining type of innovation,* entails that the innovation will lead to an improvement of e.g., an already existing product (i.e., making it more efficient). These improvements will ultimately lead to sell more products to the most profitable customers. Second, *disruptive innovation* is the type of innovation that will create a significant change by replacing an already existing product, method, service etc. Subsequently, creating a new market or value network (Bower et al., 1995). Relating this back to our case of the CBL approach in this study, CBL is an innovative approach used to improve the current educational approaches rather than replacing these. Therefore, this study makes use of the CBL components (principles) as indicators of innovation to identify the current state of innovation and the potential for change of innovative educational practices at higher educational institutions. Hence, it is not much about if there is a significant or sufficient change, but whether the improvements (CBL approach) occur throughout the educational curriculum.

Although literature reveals there are various indicators for innovation in higher education (Gault, 2013), one cannot find a standardised measurement instrument that can link all the facets of innovation together providing an overall impression. Furthermore, since CBL is a fairly new (educational) approach (Tecnológico de Monterrey, 2015) and there is no consensus on one guideline or format for CBL applicable for all higher educational institutions (Gallagher & Savage, 2020), the decision was made to develop a survey for this study. This survey is based on the identified indicators for innovation in education suggested by the literature and is subdivided into the components (principles) of the CBL approach.

As mentioned previously, innovation needs to be an improvement compared to what already exists. However, while considering all stakeholders involved in the innovation process, one can say that an improvement from one stakeholder's perspective is not necessarily an improvement from another perspective. So, an example could be the case of international partnerships between various universities, whereof the goals of one university may be prioritised differently than those of the others. All in all, in order to be able to make an inventory of the extent to which there is innovation, while there is no consensus of what improvement and innovation means, one should link the innovative indicators (CBL components) to the educational quality indicators (e.g., learning outcomes, assessment, location, alignment etc.). These are according to an OECD report (2014) well known and mostly accepted by all stakeholders (Bank & Yeulet, 2014).

There are two advantages when designing the survey according to the educational quality indicators while taking the CBL components (principles) into consideration. First, it allows to identify the main innovative component (principle) of CBL. Subsequently, this leads to an improved understanding of the potential to implement this approach partly, rather than as a whole. Second, it prevents respondents, who are unfamiliar with the term of CBL, to interpret the questions differently. The development of the survey will be further elaborated on in the upcoming chapter of methodology.

All in all, the CBL approach can be used to enhance innovation in education which could ultimately lead to an improvement in the educational curriculum. Due to the lack of a consensus on a uniform framework or guideline of CBL for all higher educational institutions, this study develops a survey (instrument) to measure the extent of innovativeness across the courses and modules and the potential for change at the UTwente. In conclusion, the survey is built upon two theoretical concepts that can be found in the literature. First, upon the educational quality indicators, more specifically the curriculum spiderweb of Van den Akker (2003). Second, the CBL components (principles) suggested by various research papers (Malmqvist, Rådberg, and Lundqvist, 2015). These two theoretical principles will be explained in more detail in the upcoming sections.

2.2. Curriculum Spiderweb Van den Akker (2003): The educational quality indicators

As already mentioned in the previous section, the CBL survey developed throughout this study is based upon two theoretical principles. One of them is the curriculum spiderweb by Van den Akker (2003). More specifically, the curriculum spiderweb is used to design the survey. Curriculum entails the meaning of 'a plan for learning' (Taba, 1962). This curriculum spiderweb is a framework used to describe the curriculum design of (higher) educational institutions. This framework is often used in relation to curriculum improvement or renewal (Van den Akker, 2010) which fits to this study's research topic of innovation in education. Furthermore, it is interesting to mention that Jan van den Akker is a part-time professor at the department of curriculum design and educational innovation at the

UTwente (Van den Akker, 2010). Subsequently, the UTwente has the support of an expert in the research area of educational innovation and issues regarding the curriculum (i.e., policy, development etc.). In addition, the curriculum spiderweb is suitable to describe the curriculum design of the courses and modules at the UTwente either. Also, for the purpose of curriculum innovation and development, the spiderweb by Van den Akker (2003) is appropriate to use for the programs at the UTwente. Therefore, this concept of the curriculum spiderweb is used as a backbone design construct to develop the questions for the survey.

2.2.1. Challenges implementing innovation in education

According to Hargreaves and Fink (2006, p.6), "Change in education is easy to propose, hard to implement and extraordinarily difficult to sustain". So, a change or innovation in education comes with its challenges and failures which is widely agreed upon across the literature (Leyendecker, 2008; Fullan, 2007). This is mainly due to communication and collaboration issues between various actors, levels and non-consistency within the design of the curriculum. Hence, as the paper of Van den Akker (2010) claims, there is a gap between how the innovation is implemented in practice, the way it is researched and the policy making process. Therefore, educational institutions need to overcome the challenges of 'building bridges' between various actors and levels to succeed in innovating their educational curriculum (Van den Akker, 2010). Subsequently, understanding the interplay of various factors, the curriculum design and components are essential for successful innovation in education.

2.2.2. Which educational quality indicators exist?

According to Van den Akker (2003), the development of the educational curriculum requires the consideration of numerous curriculum components, for instance 'materials and resources, content and goals and learning activities' (Van den Akker, 2003). Thereby, Van den Akker's (2003) paper emphasizes the essential role of alignment between the curriculum components themselves. Moreover, the curriculum spiderweb by Van den Akker (2003) is used as an illustration of how vulnerable the educational curriculum is. The curriculum spiderweb consists of the following ten curriculum components (Figure 1). First, the *Rational,* is also the central mission of the plan. It answers the questions of 'why students are learning?' Second, *Aims and Objectives,* considers the question 'towards which goals students are learning? Third, *Content,* answers the question 'what are the students learning?' Fourth, *Learning Activities,* considers 'how are students learning?'. Fifth, *Teacher role,* deals with 'how does the teacher facilitate (student's) learning?'. Sixth, *Materials and Resources,* entails the question 'with what are students learning?'. Seventh, *Grouping,* wants to know 'with whom are students learning?'. Eight, *Location,* considers 'where are they learning?". Ninth, *Time,* wants to know 'when are they learning'. And the tenth, *Assessment,* entails the question of 'how is their learning assessed?'. It is said that all curriculum components should, in a best-case scenario, show consistency, be linked to the *Rationale* component, and take it as the leading component pointing the direction. Moreover, interconnectedness and alignment of all components is a pre-requirement to sustain coherence. Additionally, it is crucial to mention that for each component, one can come up with numerous sub-questions (Van den Akker, 2010). Above all, the curriculum components are serving as indicators to assure the quality of education or more specifically the educational approach currently in use.

To sum up, the curriculum spiderweb by Van den Akker (2003) is a suitable framework to use to describe the curriculum of the programs across the higher educational institutions. The curriculum spider web is an important framework in the research area of innovation in education, curriculum development, policy, and change. However, innovation in education, including the change of curriculum holds numerous challenges (i.e., communication, collaboration and consistency issues between various actors, factors, and levels) for educational institutions). In general, there is a gap between implementation in practice, research and policy making. Therefore, it is important to understand the curriculum components and their interplay with each other to safeguard success in innovation in education. The curriculum spiderweb includes the following ten curriculum components, *Rational, Aims and Objectives, Content, Learning Activities, Teacher role, Materials and Resources, Grouping, Location, Assessment.* It is suggested to have interconnectedness and alignment between the components for the sake of coherence.

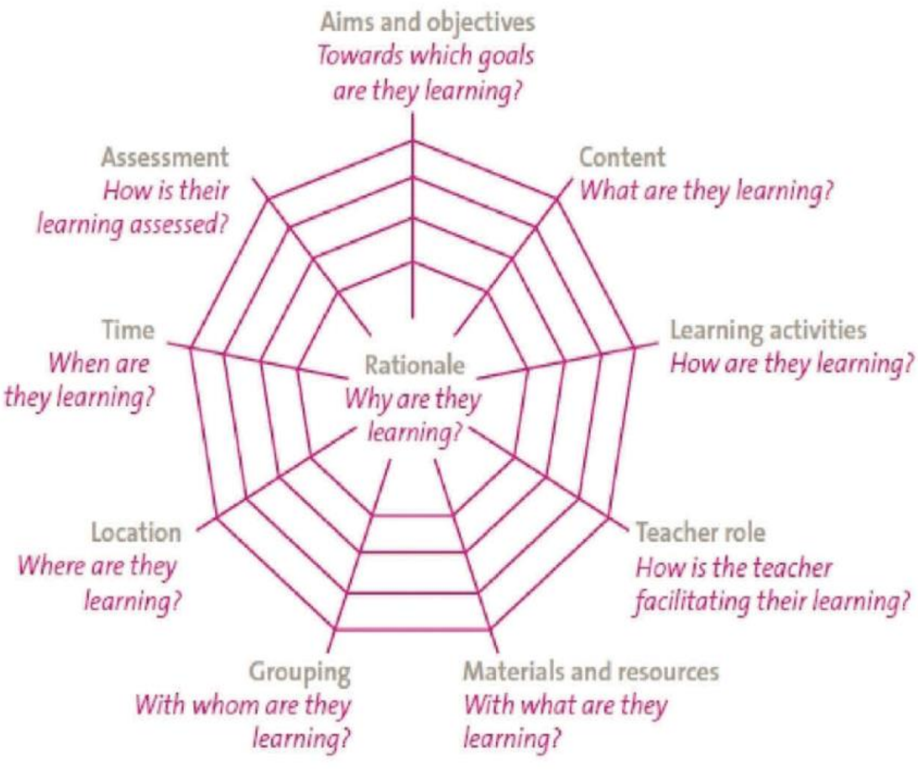


Figure 1: The curriculum spiderweb (curriculum components) (Van den Akker, 2003).

2.3. Definition and components (principles) of CBL

Prior to identifying which CBL components are already available or implemented, one needs to understand and determine a definition of the CBL approach. Therefore, during this section a definition of CBL and the CBL principles are presented. Moreover, the CBL principles are used as the second concept to develop and create the questions and structure of the survey/questionnaire. A list of relevant CBL papers or guidelines and innovation in education across the literature can be found in Appendix A.

2.3.1. What is CBL and what are the key differences with associated educational frameworks?

The recent and sole literature review of the CBL approach available across the literature is undertaken by Gallagher & Savage (2020). This literature review found that although there is a range of research papers and guidelines about the CBL approach, ambiguity regarding standardization and conceptualization of the CBL approach requires exploring more in this research area (Gallagher & Savage, 2020). Furthermore, CBL is a relatively new approach for higher educational institutions (Tecnológico de Monterrey, 2015). However, increasingly more higher educational institutions are planning to implement CBL or already tried to integrate it in their educational curricula (i.e. programs, pilot projects, extra curricula activities etc.) (Johnson & Brown, 2011; Nichols et al., 2008; Rådberg et al., 2020). The study of Nichols et al (2016) emphasizes the importance of using the CBL approach to bridge the gap between theory taught at higher educational institutions and the application of it in the real (business) world (Nichols et al., 2016). Especially, the development of the 21st century (enterprise) skills (Smith & Pathon, 2014) is essential to be enhanced when solving authentic sociotechnical societal challenges (Nichols and Cator, 2008). So, the paper of Nichols and Cator (2008) states that CBL involves the use of challenges enhancing learning and motivation to learn with multiple stakeholders, in multidisciplinary teams, using (latest) technology to solve authentic, real world problems (Nichols and Cator, 2008).

As previously mentioned, although there is a range of research papers introducing frameworks/concepts of the CBL approach (Apple Inc., 2011), hybrid approaches (i.e., problem-or project-based learning approach) (Chirac et al., 2008; example of Linköping), and guidelines or examples to integrate CBL in the educational curricula (Tecnológico de Monterrey, 2015), ambiguity issues arise for understanding CBL. So, as due to the existence of varying conceptualizations and examples by using the term of CBL across the literature, it becomes challenging to have a unified definition and view of the CBL approach (Gallagher & Savage, 2020). Subsequently, researchers and practitioners from for example higher educational institutions who want to integrate CBL into the educational curriculum will face challenges to understand what CBL is and to successfully apply it in practice. Moreover, inconsistencies in the way of reporting the results of various research studies that applied CBL leads to a biased view on which methods to use to integrate CBL into educational curricula (Gallagher & Savage, 2020). All in all, despite the increasing interest for the CBL approach, there is limited knowledge on how CBL can be integrated successfully in an ongoing educational curriculum.

Although there is no consensus on a clear definition of CBL across the literature, a suitable definition for CBL up till today is given by Malmqvist et al. (2015). According to Malmqvist et al. (2015),

"Challenge-based learning takes places through the *identification, analysis* and *design* of a *solution to a sociotechnical problem*. The learning experience is typically *multidisciplinary*, involves *different stakeholder perspectives*, and aims to find a *collaboratively developed solution*, which is *environmentally, socially and economically sustainable*" (Malmqvist, Kohn Rådberg, and Lundqvist, 2015, p.87).

Hence, CBL is an active learning strategy/approach involving actionable solutions. The paper of Johnson & Brown (2011) unfolds the core idea of CBL which is to *make learning relevant* (Johnson & Brown, 2011).

There are two varieties of frameworks of the CBL approach across the academic literature. First, the STAR Legacy Cycle used by the Vanderbilt University (VaNTH/ Vanderbit, Northwestern, Texas and Harvard/MIT). This STAR Legacy Cycle is explained in one of the earliest studies and with it the introduction of CBL for the first time by Birol et al. (2002). It is based on the pedagogical framework of the book by Bransford et al. (1999) 'How people learn' (Bransford et al., 1999). The STAR Legacy Cycle includes the following six stages; *1) challenge, 2) generate ideas, 3) multiples perspectives, 4) research and revise, 5) test your mettle, 6) go public* (Birol et al., 2002). The second CBL framework was introduced by Apple Inc. in 2008 within their report of the project 'Apple Classroom of Tomorrow-Today' (ACOT2) (Nichols and Cator, 2008). This project intended to point out the most critical design principles of a learning environment/workplace in the 21st century. For example, students were encouraged to use technology (i.e., digital videos) as deliverables. The CBL framework which derived from the Apple Inc. Project (2008) involves the following tree main stages: *1) engage, 2) act and 3) investigate* (Figure: 2). And within each stage there are three steps: *a) Big Idea, b) Essential Question, c) Challenges, d) Guiding Questions, e) Guiding Activities and Resources, f) Analysis, g) Solution Development, h) Implementation and i) Evaluation.* Moreover, all the steps can be constantly described, monitored, and analysed based on the three optional aspects: *Informative Assessment, Documentation and Publishing, Reflection and Dialogue.* All in all, this approach involves a learning process where the student engages in collaborative activities with educators, industry, external stakeholders to ultimately come up with authentic and creative solutions to real-world challenges/problems (Nichols and Cator, 2008).

Figure 2: The Challenge-based learning framework (Nichols and Cator, 2008)

In addition, numerous papers such as case studies and other research studies were derived from the Apple Inc. (2008) paper. Moreover, hybrid approaches used by for instance universities (famous case studies of Chalmers University and Linköping University (2008)) emerged. Furthermore, the research study by Chanin et al. (2018) identified how many institutions of higher education applied CBL for the purpose of enhancing student engagement and collaboration. Another study was undertaken by Cheng (2016) who says that the CBL approach enhances the development of the student's 21st century skills. Also, the paper of Cheung et al. (2011) describes that one characteristic of CBL is that it involves a real-world problem which is part of the student's learning process. In conclusion, for the sake of this study, the latter framework of CBL by Apple Inc. (2008) will be used as a backbone concept for this paper, due to its frequent across the CBL literature. Additionally, it is a more recent and detailed approach used for various disciplines (biotechnology, engineering, mobile application education etc.) (Rådberg et al., 2020; Chanin et al., 2018; Membrillo-Hernández et al., 2018; Cruger, 2018).

As mentioned previously, a controversial issue is the pedagogical heritage of CBL and its predecessors or, as Gallagher and Savage (2020) suggest, the 'underlying overarching concept the CBL approach could fall under'. So, regarding this issue there is no consensus across the literature. While some papers claim that CBL falls under concepts of 'experiential learning' (Gama, 2019; Chanin et al., 2018), others say CBL falls more under 'active learning' (Membrillo-Hernández et al., 2019; Hernández-de-Menéndez, 2019). Whereby others describe the CBL concept as a combination of both (Gibson et al., 2018). A further issue is that CBL is mentioned interchangeably as similar teaching approaches such as problem-based or project-based learning (May-Newman and Cornwall, 2012). Nonetheless, there are research papers emphasizing the difference between CBL and other teaching approaches (i.e., project or problem-based learning) (Appendix B: Figure 5 and 6: Difference between CBL, project-based and problem-based learning) (Binder et al., 2017). So, for instance, there is no predefined challenge or study when applying the CBL approach (Binder et al., 2017). Furthermore, besides educators, other external stakeholders are actively involved in the student's learning process and are perceived as co-learners or co-creators (Membrillo-Hernández et al., 2018; Garay-Rondero et al., 2019). Additionally, the CBL approach emphasizes the importance of the learning process rather than only the outcome and putting the attention towards making learning more relevant for students. As well, problems that need to be solved should entail issues regarding sustainability and a solution to an emergent (local) problem (Garay-Rondero et al., 2019). Nonetheless, although CBL has some similarities with the project and problem-based learning approaches (Rådberg et al., 2018), one needs to acknowledge that CBL imminently differs from other teaching approaches. It has a distinct definition and framework of its own.

2.3.2. What are the core components (principles) of CBL?

This finally leads us to introduce the CBL components (principles) which are commonly agreed upon across the academic literature. The questions of the survey will be built upon around these CBL components (principles).

1) *Flexibility: (Flexible learning paths) (FLP):*

One of the unique characteristics of the CBL framework is that it is flexible and customizable which means it can be used also in combination with other teaching methods. Furthermore, the CBL framework is a scalable model allowing for multiple points of entry and to be able to start small and build big (Nichols et al., 2016). This also means that students have the freedom and choice to pick the challenge or subject/project they want which is motivating the students to learn (Binder et al., 2017). Also, the pace of learning can be decided upon. So, students decide what and how they want to learn. The decision on the learning path and process lies in the hands of the students.

2) *Stakeholder involvement (ST):*

A crucial requirement of CBL is the active involvement of internal (students, educators/academics) and external (industry, businesses, governments) stakeholders in the student's learning process (Rådberg et al., 2018). These internal and external stakeholders are considered, different to other pedagogical approaches, as co-learners who needs to be actively involved and engaged to learn (Malmqvist et al., 2015). Therefore, stakeholders do also have the responsibility to contribute to the learning process as teachers and learners (Nichols et al., 2016). Subsequently, students need to take the perspectives of all stakeholders into account throughout the whole learning process (Larsson & Holmberg, 2018). Furthermore, students are asked to work and collaborate closely with all stakeholders to identify and define complex challenges and to come up with relevant questions (Cruger, 2018; Rådberg et al., 2018;

Gibson et al., 2019). Hence, stakeholders are also considered as those who provide universities/students with challenges that needs to be solved. Especially, the (local) community is considered important to provide inspiration for challenges that need to be tackled urgently (Binder et al., 2017). Another important role stakeholder hold is that they are enhanced to be co-assessor and be involved in the assessment process. Namely, when students present their deliverables to the stakeholders (Apple Inc., 2011).

3) (Students as) co-designers (CD):

A further important aspect is the role of the student throughout the learning process because they decide what and how their learning experience will look like which is due to CBL being a student-centred approach (Johnson et al., 2009). This also means that they are next to the educators/academic, co-designers of their own learning process and paths. Together with educators, students can design the challenge and decide upon which learning activities the challenge will require (Apple Inc., 2011). Also, both may agree and discuss which Intended Learning Outcomes (ILO's) they want to achieve. In addition, the learning activities are structured in a manner to enhance student's motivation to act, to be kept responsible for the solution and to take decisions themselves (Tecnológico de Monterrey, 2015). Subsequently, together with all the stakeholders, students are involved in the planning process of the project/challenge (Nichols et al., 2016). Furthermore, students are in charge of choosing which resources (i.e., technical resources or peers) they need and want to use to ultimately come up with a solution to the challenge/problem (Binder et al., 2017). Moreover, they are responsible themselves to reflect upon their learning process (i.e., reflection reports) which is the essential element of the CBL approach and framework 'Reflection' (Nichols et al., 2016). Lastly, student will have a say on how they will be assessed. They may design their own exams or choose which assessment method use to prove their performance/solution (i.e., formative, and summative assessment methods) (Tecnológico de Monterrey, 2015).

4) Interdisciplinarity (ID) (collaboration):

One of the CBL requirements is that groups should work in multidisciplinary teams (Malmqvist et al., 2015). However, interdisciplinary work is required for the CBL approach which means that "methods and knowledge from different disciplines are integrated by using a synthesis of approaches" (Jensenius, 2012). Therefore, this study will use the term "Interdisciplinarity" which seems more suitable for describing the CBL approach. In general, throughout the CBL literature, collaboration is described as one of the most essential competencies serving as a tool to ultimately develop solutions to the challenges (Santos et al., 2015; Membrillo-Hernández et al., 2018). Therefore, students from different backgrounds and disciplines collaborate with each other in teams or groups (Da Costa et al., 2018). Also, do the students collaborate with educators/academics and extra-academic stakeholders (i.e., industry partners) from different disciplines and backgrounds for the sake of receiving feedback, defining the challenges and to ultimately come up with a solution to act upon (Malmqvist et al., 2015; Cruger, 2018; Gibson et al., 2018). Moreover, the collaboration between all stakeholders is said to hold benefits such as enhancing motivation, deeper knowledge creation and enhancing industry-specific training (Gallagher & Savage, 2020; Barth & Luft, 2012; Tecnológico de Monterrey, 2015).

5) *Enterprise Skills (ES):*

Another benefit the CBL approach brings along the acquirement of new knowledge is the development of enterprise skills across the students (Tecnológico de Monterrey, 2015), which are also referred to as transferable/transversal skills or the 21st century skills (Smith & Pathon, 2014). In consequence, important skills like critical thinking, risk taking, problem solving, leadership skills, collaboration, communication, and many more will be acquired by students (Crawley et al., 2014; Huntzinger et al., 2007). Moreover, the CBL approach will enhance students to cope themselves with failure they encounter during the learning process and while collaborating with various stakeholders to find a solution to contradicting visions. Also, the students will be enhanced to continuously reflect upon their learning process and each stage they go through to solve the challenge (Nichols et al., 2016). This in turn has a positive impact on students employability and the acquirement of lifelong learning skills (Nichols and Cator, 2008).

6) *Learning in learning communities (LC):*

Additionally, the CBL approach puts the emphasize on collaborative learning. So, that all stakeholders involved are considered as co-learners (Nichols et al., 2016). Especially, CBL requires the provision of a space/location, which should be a technology rich learning environment, to enhance the learning experience with all stakeholders (i.e., peer learning taking place). Therefore, it is important for students to be in a close and in direct touch with various stakeholders. Moreover, students should actively participate with for instance their peers, stakeholders, and teachers (Rådberg et al., 2018). It will be helpful for the sake of the actual implementation of the solution. Subsequently, this leads to the formation of a learning communities where all stakeholders actively engage and learn to ultimately come up with a solution to the challenge (Malmqvist et al., 2015).

7) *Teacher role: (TR):*

The CBL approach prescribes a certain role for the teacher. So, as previously described, the teacher is considered as an active learning partner and co-learner (Malmqvist et al., 2015). However, next to that the teacher has the role of a coach, co-researcher and designer which is unique compared to other pedagogical approaches (Baloian et al., 2006; Tecnológico de Monterrey, 2015). So, the teacher is actively involved throughout the learning process.

8) *Real world experiences and challenges (RW):*

An essential requirement of the CBL approach is to identify global complex (socio-technical) challenges/problems with local solutions (Binder et al., 2017). These real-world challenges will enhance students to gain real world experiences by implementing their solutions and engaging closely with the industry (i.e., local companies) (Gaskins et al., 2015). So, for instance the solutions will be presented to the broad community. Subsequently, these solutions will be evaluated and validated in the real (business) world (Martínez, 2019). Furthermore, students need to come up with real prototypes of their ideas and solutions throughout the stages of the CBL process for the sake of visualization and feasibility (Rådberg et al., 2018).

See Appendix B: Figure 7, for an illustration of operationalization of the theoretical framework.

2.4. The theoretical framework: A combination of CBL components and the curriculum spiderweb: How can the presence of the CBL components be assessed in existing courses and modules?

By using a survey instrument which combines the design of the curriculum (i.e., curriculum spiderweb) with CBL components, it will be possible to assess to what extent the core components of CBL are present across the courses and modules. The following chart illustrates the combination of the two theoretical concepts described previously. It shows that one can assign each of the CBL components to the curriculum spiderweb components. This is an illustration which lists all the details regarding the two concepts and is the backbone construct for the survey developed in this study.

	AIMS & OBJECTIVES	CONTENT	LEARNING ACTIVITIES	ROLE TEACHER
Dimension	The learning outcomes are important because they set the foundation for what happens in every other step. Consider spending the first day of the course developing the learning outcomes together with the students	Content is about what students need to learn in order to achieve the learning objectives and how curriculum should be structured.	The learning activities reflect how the learning occurs for example the choice for the mode of delivery such as lecutres, group work online, blended guest lecturers self-learning, etc.	The most common role an educator plays in the classroom is to teach knowledge to students. However all other tasks and for example the work load should also be taken into account when designing a course
CBL features	• Real wicked problems • Self-directed learning • Applicable solution • Flexible education pathways • Societal challenges • Competence portfolio • Interdisciplinary • Opportunity to accelerate • Excellence opportunities • Ethically awareness • Synthesise multiple perspectives	• Content can be mastered independently • Subject matter is embedded in real-world context • Content is partially based on individual areas of interest of students • Adressing knowledge gaps • Addressing skill gaps • Enable students to take courses elsewhere • Development of employable skills • Critical and higher order thinking skills • Exploring domain-specific knowledge and research evidence that underpins current understanding of the discipline	• Peer learning among students • Educators with different disciplinary backgrounds collaborate with the students • Stakeholders collaborate with the students • Students can determine individually how they wish to achieve the learning outcomes • The solution should at least be presented to one of the involved stakeholders with a request for feedback • Collaboration with alumni • Conferences • Thinking tanks • Gast lectures	• Educators act as a coach • Provide students with learning partners • Encourage ownership in the learning process • Supervise and review teams progress • Intermediary between the students and stakeholders

	MATERIALS & RESOURCES	GROUPING	LOCATION	TIME
Dimension	Determine the materials and resources that will be used. Choices that need to be made include which literature and other sources but also the use of guest lecturers and lab work. What are the criteria for the selection of resources that are used throughout the learning process	With whom are they learning How are students allocated Are students learning individually in small groups etc.	Where are students learning What are the social and physical characteristics of the learning environment	Think about the time available for various topics. And what is the time to spent on self-study and time spent on teacher-student contact or student-student contact.
CBL features	• Open data and information are used interpreted refined digested and discussed background knowledge interests • Purposeful use of technology for research organisation, communication networking collaboration, publishing and evaluation • Enable students to determine the mode of delivery • Make use of powerful technology • Cognitive computing • VR/AR • Learning analytic (Living textbook)	• Groups are based on their own specific qualities such as skills personal traits, background knowledge interests • Interdisciplinary collaboration • Peer learning • Stakeholders as learning partners • Educators as learning partners • Community as learning partners • Alumni as learning partners • Educate students in how to work together • Form learning communities	• Enable students to take courses elsewhere • Provide students access to a workspace which can be used freely (24/7), for instance the innovation lab • Extended classroom • Micro-credentials	• There is time dedicated to reflecting on the student's learning process • The learning process should be intentionally slowed down at times • Enable students to determine the study intensity • Opportunity to accelerate

	ASSESSMENT	RATIONALE
Dimension	What is incorporated into a core curriculum should be clearly reflected in examination and assessment approaches How to measure how far the learning has progressed and when where who	Describes why students are learning think about what the academic and disciplinary heritage is that seems essential for learning and future development. Think about which societal issues and needs seems relevant to take into account. Think about how this generation students learn best.
CBL features	• Assess progress and the learning process separately from the final result • Let students demonstrate their findings to a wider audience to collect real feedback for improvement • Let students have a say in which criteria they will be assessed on • Assess the reflection skills. Train them in how they can reflect • Opportunity to accelerate • Consider non- traditional assessment methods • Let students decide the weightings of some of) the test items	• Freedom and opportunity • Risk taking • Interdisciplinary • Focus on societal or innovation questions • Encourage students to critically examen their own perspectives and learning from differences of opinion • Networking • Learning from mistakes • Reaching out to the community • Encourage students to critically explore and assess the socio-technological boundaries of their study object • Discuss conflicting visions within the discipline

Figure 3: The theoretical framework for developing the survey instrument: A combination of the curriculum spiderweb and the CBL components.

3. Methodology

3.1 Aim and Type of Research

As already mentioned in the introduction, the aim in this study is to measure the extent to which CBL is already implemented at the current state. And, if the courses and modules have the potential to implement CBL across the courses and modules of all faculties at the UTwente from the perspective of course and module coordinators. Therefore, the aim of this study is to develop and apply the survey instrument. So, from the framework discussed in paragraph 2.4., a survey will be designed for empirical use. This survey measures the status quo and the potential for change to implement CBL in ongoing educational curricula. The UTwente and the courses and modules across all faculties serve as a case for the sake of executing the survey. This is because UTwente strives towards innovation and shows an interest in adopting educational innovative pedagogies such as CBL (4TUCEE, 2020). But in general, the survey serves the community and institutions that are interested in applying CBL in a pedagogical responsible manner including the implications it has for change at the institutional and program level. After the execution of the survey, recommendations are given on which courses and modules have more potential to apply CBL and which ones do already apply educational innovative practices. Finally, all in all, this research will suggest an initial measurement instrument (survey) to measure the extent to which CBL is available throughout a course/module and if these have the potential to change and apply CBL.

As the research question already predicts, descriptive research will be conducted throughout Q1 of the Master study IBA. Furthermore, this paper introduces quantitative descriptive research which draws on the case of the UTwente. The first part of the study involves the identification of innovation in education and CBL principles theories and concepts relevant to the issue under study (academic research) to develop a measurement instrument (the survey). In addition, the focus of this paper is more towards the academic literature of Challenge based learning at higher educational institutions. Therefore, the research method required to collect the necessary data is a preliminary literature review (See chapter 2: Theory). This requires studying relevant information collected from already existing literature/scientific papers. The second part of the research involves the development of the survey instrument, the identification and collection of email addresses of all course and module coordinators at the UTwente, the distribution of the survey via email and sending out reminders. Afterwards, an analysis of empirical data follows. This requires the collection of empirical data obtained with the survey which will provide new insight into this field of knowledge (CBL at higher educational institutions). So, a developed closed-structured questionnaire is distributed to course and module coordinators at the UTwente. For conducting the questionnaire, an online access to the survey (a link to the survey) is required. All in all, this is a deductive study whereby general hypothesis and theory is tested with the help of the survey. Subsequently, this leads to more specific observations of empirical data. So, the analysis of the empirical results will provide some insightful thoughts and patterns recommended for further research. And this also means for answering the research question a combination of primary and secondary data will be used throughout this research (Dooley & Lichtenstein, 2008).

To sum up, this research study aims to contribute to the current knowledge by providing new insights on how to measure the extent of CBL and the potential for change within a higher educational institution. Also, to unfold patterns on which programs and faculties include already CBL components/principles and have a higher potential for change. By undertaking a preliminary literature review of theories, methods, and concepts of innovation in education and CBL, a survey instrument could be developed throughout this study. Additionally, the courses and modules of the UTwente will be used as a case, to apply this instrument and leading to a more in-depth understanding. Subsequently, certain new insights and aspects adding to already existing theories and concept, illustrate the theoretical implication of this research. However, this research has a major practical contribution for the community in general who is interested in applying CBL and institutions of higher education, especially for the UTwente. This study will identify the courses and modules that are doing already well with applying innovative practices and those that do not. So, this study can be used as an initial draft to improve innovation in education in ongoing educational curricula. Furthermore, the responses of the course and module coordinators will reveal aspects to consider for improvements. This in turn ultimately would lead to the implementation of CBL in a pedagogical responsible way including the implications for change at the program and institutional level in higher educational institutions. Whereby all stakeholders (UTwente, students, community, industry, governments) could benefit.

3.1.1 Methodological approach

So, to reach the aim in this study the following actions need to be undertaken.

Overall action to be undertaken:

- To identify the current state of innovation and the potential for innovation or change across the courses and modules of all faculties at the UTwente from the perspective of course/module coordinators.

Specific actions to be undertaken: (also includes Hypothesis):

- To identify the CBL components currently used and whether these have the potential in the future to be used throughout the courses and modules.
- To identify if the average current state of innovation (per CBL component) or the average potential state of innovation is higher.
- To identify if the average of each CBL components (principles) is higher in the potential state than in the current state.

- To identify if a CBL components in the current and potential situation scored 'below', 'on', or 'above the average'.
- To identify if the current state of innovation (per component) is higher if the course/module coordinator has more experience.
  H1. 0= There is no difference
  H1. 1= There is a difference
- To identify if the potential state of innovation (per component) is higher if the course/module coordinator has more experience.
  H2. 0= There is no difference
  H2. 1= There is a difference
- To identify which faculty currently uses most of the CBL components.
- To identify which faculty indicates the highest potential for change.
- To identify if there are more CBL components in the bachelor courses/modules or in the master courses/modules. And, to identify if bachelor courses/modules or master courses/modules have more potential to integrate more CBL components.
- To compare the use of CBL components in the current state vs. the potential for them across the study years (1^{st} to 3^{rd} year of study).
- To identify if the use of CBL components currently present will determine the ultimate potential.

3.2 Sources of Data and Sample

Data is collected by means of a combination of a preliminary literature review and survey to answer the research question. Therefore, secondary data needs to be collected which are mainly ISI peer reviewed articles acquired through the 'Web of Science', Science Direct, Emerald, Taylor and Francis Online, Elsevier, Pearson, Journals of engineering education; sustainability; innovation in education; information systems education; teaching and teacher education; teaching in higher education; international journal of engineering pedagogy; research on technology education; learning sciences; biomedical engineering, and various reports and guidelines on CBL (i.e. Linköping university, (Tecnológico de Monterrey) and the proceedings of conferences i.e. CDIO. The frequency of citations by other authors was a further criterion whether to use the article/report for this paper. However, one needs to consider that the research subject of CBL is relatively new which leads to a less frequent citation rate by other authors. Next, collected primary data included email addresses of course and module coordinators retrieved from digital learning platforms such as OSIRIS. For the sake of the primary data collection and empirical data, a closed-structured survey/questionnaire will be designed. Regarding the population, these will be all course and module coordinators at the UTwente (Sampling frame: Couse and module coordinators from the faculties of BMS, EEMCS, ET, TNW, ITC at the

UTwente; Sampling method: Purposive (selected) sampling). The predetermined optimal sample size required for this closed-structured questionnaire is approximately 10% from the population (631), hence 63 responses are set as a target to receive. One needs to consider that this survey is quite time-consuming for the respondents to fill in. So, due to the nature of the survey and type of questions (closed and some open ended questions) one can expect also for a smaller number of surveys filled in credible and valid outcomes. Non-response will be handled by ensuring confidentiality, using pretested questions, and sending reminders by mail.

Process and distribution of the survey

After writing down the questions/statements, the final survey is designed and created with the survey software and tool Qualtrics. However, beforehand for the sake of identifying all the course and module coordinators available across the faculties of the UTwente, the student information system OSIRIS was used. In total 631 email addresses of course and module coordinators were retrieved from OSIRIS to ultimately send the survey link to. Furthermore, an introduction letter was distributed via the mailbox of the head of the CELT department to the course and module coordinators with a link to the survey. Also, a reminder email was sent two times to the course and module coordinators to participate and complete the survey. Subsequently, this supported to reach out to more respondents and to increase the response rate.

3.3 Data Collection

To facilitate data collection secondary data was collected by gaining access to the email addresses of the course and module coordinators via Osiris. Additionally, empirical research papers and papers on CBL and innovation in education were collected via reliable databases such as ‘Web of Science’ and those mentioned in the previous section. Subsequently, a preliminary literature review is conducted which is used for the purpose of developing the survey instrument. In addition, to collect empirical primary data, a survey was conducted in the form of closed structured questionnaire. Furthermore, to not confuse the respondents (course and module coordinators), the subject of the survey which was CBL was not given away to them. Although they were given an introduction including the purpose of the study was ‘didactic approaches’, but not explicitly CBL was mentioned. Also, the answers are kept anonymously. Subsequently, this enhances to avoid bias such as demand characteristic bias where the respondent obtains information about CBL in advance and prepares their answers accordingly or take a certain negative or positive attitude towards the subject. All in all, the data collected from the survey will complement the findings of the preliminary literature review and extend the existing knowledge, especially the survey instrument introduces an initial inspiration for further research. However, a source for bias of this survey can be the Likert-scale which can lead to neutral or extreme response bias. Further threats could be biased results based on the complex and lengthy design of survey and questions gives rise to validity, e.g., Construct validity, and reliability issues (Dooley, 2008). Nonetheless, reliability tests were undertaken with the statistical data analysis software SPSS which will be explained more in detail in the results section. So, for analysing the results of the survey, a qualitative data analysis and research software, SPSS, were used for statistical data analysis. In consequence, the collected empirical data were manually categorized and labelled manually in SPSS according to the CBL components (principles). A statistical report will be presented in the results part.

3.4 Survey Design

This section describes the decisions made regarding the design of the survey in this study. The survey developed in this study was designed based on the following three main purposes and considerations. Firstly, the survey was designed to reflect a broad variety of courses and modules at the UTwente. Second, by designing this survey one wishes to obtain results from it that can be translated into some statistical or numerical form. This in turn can be used as reference data for further studies. And lastly, a survey was needed that reflects and incorporates the Challenge based learning framework.

In general, this survey got developed and refined in four steps. (1) writing down the questions; (2) external review of the survey; (3) pre-test of the survey; (4) repeated review of the survey. Subsequently, after each step, a revision of the questions and survey was undertaken. The first step entails to choose the CBL components (principles) in a list and correspondently write down the questions and assign these to each of the CBL components (principles). The formulation of the questions was done with the help of two academic experts. Afterwards, during the second step, staff and experts from the Saxion University of Applied Sciences were invited to review the survey instrument. These reviewers were curricula designers, educational researchers, social scientists, and smart semester educators. Subsequently, in response to the suggestions of the reviewers the survey was revised and adjusted. Following this, during the third step, a pre-test was conducted with eight teachers. These respondents were two minor coordinators, and the others were teachers with the subjects English, Marketing, Politics, Communication skills, Economics and Big data sciences. They were provided with the Qualtrics link to the survey and were asked to document their thoughts while filling in the survey. After that the reviewers shared their thoughts and ideas. Consequently, the survey was adjusted and revised again according to the suggestions of the respondents. And finally, during the last step, an online face-to-face review meeting was undertaken with two educational experts of the Centre of Expertise in Learning and Teaching. Also, they were provided with the link to the survey and were asked to share their thoughts verbally while completing the survey. So, in conclusion the survey was adjusted and revised again according to the reviewers suggestions.

Finally, the latest version of the survey got designed accordingly. The introduction letter with the purpose of the study is sent as an email to the course/module coordinators including the link to the survey. The survey itself contains the consent form in the beginning. After that the survey was constructed into three main parts. First, the questions on background/general information. Second, questions on the current state of educational innovative practices, CBL components. And third, questions on the potential state of educational innovative practices, CBL components. The first part entails twelve questions covering factors which could influence the potential state of innovative educational practices of a course or module such as the experience of the course or module coordinator, the type of study program to see where the course or module is positioned, the study year and general information regarding the teaching or assessment methods used by the course/module coordinators. The second part of the survey, the current state of educational innovative practices covered ten themes/components (the curriculum spiderweb components by van den Akker (2003)) and entails thirty-six questions. Learning activities (LA); Location (LO); Assessment (AS); Aims and Objectives (AO); Content (CO); Group work (GR); Teacher role (TR); Rationale (RA); Materials and Resources (MR) and Time (TI). These are used to structure the survey and to bundle the questions/statements into smaller groups. Furthermore, there are eight CBL principles/components, from which the questions were derived from, 1) Flexible learning path (FLP); 2) Stakeholder involvement (ST); 3) (Students as) co-designers (CD); 4) Interdisciplinarity (ID); 5) Enterprise skills (ES); 6) Learning in learning Communities (LC); 7) Teacher role (TR); 8) Real world experience (RW). These eight CBL principles/components are assigned to each of the ten previously mentioned curriculum components. The CBL principles/components were used to formulate the statements. The third part of the survey, the potential state of educational innovative practices, used the same questions as the previous part. Only this time the questions were rephrased to obtain answers if the course or module coordinators saw the potential of the modules/courses for implementing educational innovative practices. (See Appendix C for the complete introduction letter and full version of the survey).

All the questions in the second and third part of the survey were phrased and presented as statements wherein the focus lied on reflecting the core CBL principles/components identified throughout the literature. After each statement the respondents were asked to rate on a 5-point Likert scale. This scale was ranging from 1= “not at all” to 5= “to the full extent” (Vagias, 2006) to rate the current state of innovation in educational practices in the second part of the survey. This scale measures to what extent the course/module is already implementing educational innovative practices (CBL) from the perspective of course/module coordinators. A further 5-point Likert scale was used in the third part of the survey ranging from 1= “Definitely not” to 5= “Definitely” (Likert, 1932) to rate the potential for implementing educational innovative practices (CBL). This scale measures the probability and likelihood of implementing educational innovative practices in the courses/modules.

The following table represents the first draft used to structure and develop the survey instrument.

First draft of the survey instrument		
Curriculum spiderweb components	CBL component/principle	Item
Aims and objectives	Enterprise skills	We specifically assess transferable skills not specific to the domain, such as critical thinking, collaboration, communication

Aims and objectives	Stakeholder involvement	Students demonstrate their intermediate results to a wider audience (i.e., stakeholders, community etc.), for instance to collect feedback for improvement
Aims and objectives	Real world experience	Students solve actual complex/wicked problems provided by the real-world
Assessment	Teacher role	We assess student achievements throughout the learning process rather than the end-result only
Assessment	Flexible learning path	Students can determine the pace of their own learning process. This includes the moment that they want to be assessed (for instance to submit their paper)
Assessment	Flexible learning path	Students themselves document their entire learning process for assessment purposes
Assessment	Flexible learning path	Students have a say on how they will be assessed
Assessment	Stakeholder involvement	External stakeholder are co-assessors (regardless of if this involves summative or formative assessment)
Content	Flexible learning path	The content is adjusted to the individual areas of interest of students
Content	Enterprise skills	The content is acquired through peer learning
Groupwork	Flexible learning path	Student group formation is based on their own specific qualities such as skills, personal traits, background knowledge, interests, etc.
Groupwork	Interdisciplinary	Students work in multidisciplinary teams of students with different educational backgrounds
Groupwork	Learning in learning communities	Students are part of a learning community (e.g., with industry representatives, professors etc.)
Learning activities	Stakeholder involvement	External stakeholders are actively engaged in critical parts of the learning process/activity
Learning activities	Real world experience	Students develop knowledge and skills through experience (i.e. real world learning experience such as working with industry experts, presenting results to them etc.)
Learning activities	Enterprise skills	As part of the feedback sessions, students are asked to raise critical questions
Learning activities	Enterprise skills	A substantial part of the learning activities is dedicated to students reflecting on the learning process
Location	Co-designer	We have reserved an additional workspace for students to use freely whenever they need it
Location	Flexible learning path	Students can explore a location outside the University that is central to the subject matter
Materials and Resources	Enterprise skills	Students use the latest technology and methods within their field of study
Materials and Resources	Co-designer	Students choose the key learning materials themselves
Materials and Resources	Learning in learning communities	Students are part of the research community
Materials and Resources	Co-designer	Students build a prototype/solution

Materials and Resources	Real world experience	Students test the prototype/solution under real life conditions, evaluate and optimize it
Rationale	Flexible learning path	Students discuss ongoing contradicting viewpoints lingering within and outside the course discipline
Rationale	Co-designer	Students develop their own learning outcomes/goals in line with the existing Program-level Intended Learning Outcomes (PILO's)
Rationale	Stakeholder involvement	The solution/conclusion reflects the ethical considerations of the stakeholders affected by the solution
Rationale	Flexible learning path	We do not intervene if students make mistakes in critical parts during their learning process
Rationale	Flexible learning path	Students take risk and experiment to critically explore and assess the boundaries of their learning object
Teacher role	Teacher role	The educator act as a coach during the learning process rather than being a lecturer
Teacher role	Teacher role	Educators are considered senior partners in the learning process
Teacher role	Teacher role	This course/module is continuously updated with the latest innovative didactic methods
Teacher role	Teacher role	The educator provides students with a variety of learning partners within as well as outside the campus
Time	Flexible learning path	We deviate from the planning when students are interested in lateral aspects of the course content, even if that means not everything that was planned can be done
Time	Flexible learning path	We adjust the pace of the learning activities whenever necessary, allowing students to process what they have learned
Time	Co-designer	We offer time to let students (re-) consider different perspectives to craft thoughtful solutions

Table 1: First draft of the survey instrument

4. Results

This chapter entails the statistical results of the survey. All the specific research objectives listed in Chapter 1: Introduction and the specific actions that need to be undertaken in Chapter 3.1.1: Methodological approach, will be answered in here. First an introduction to the new scales with the help of pre-tests is given to enhance the coding of the questions. These new scales will be ultimately used to analyse the data. Afterwards, some general outcomes about the data are presented. The main part of the results chapter entails the comparison of the current vs the potential state. This entails 1) a comparison of the averages current vs potential state. 2) Test of association, use and potential of CBL between various independent variables (years of experience; type of faculty; study program; study year) and the dependent variable (CBL components) in direct comparison of the current and potential state. 3) Correlation between the current and potential state to identify if the use of CBL components currently present will determine the ultimate potential. 4) The outcome of observation of individual cases. It is important to note that the analysis of the results of this chapter will follow in the chapter 5: Discussion.

4.1. Pre-test and new scales

In total a response rate of 10% from 631 was expected and ultimately achieved. Hence, we received in total 121 responses. Out of that, 74 responses were complete. However, finally 72 responses were used as valid and complete responses for the analysis. Two respondents were taken out due to low and incomplete responses to avoid confusing the overall results. The results were exported from the survey software tool Qualtrics as an SPSS datasheet. Afterwards, any changes to the results data sheet and statistical tests were done with the statistical data analysis software SPSS. Subsequently, reliability tests were undertaken to put the scales together and adjust these. So, each scale entails a group of questions that refers to a CBL principle/component. However, it is important to mention that the reliability tests served as a pre-test and revealed that the scales needed to be rearranged and items should be placed into different scales. This is mainly due to the overlap of the already mentioned CBL components (principles) which means that certain items can be placed also into several scales simultaneously. Consequently, in total it ended up with 5 scales for our statistical model. So, one knows that we measure the same with the items put into each scale/group. Furthermore, for the sake of adjusting the scales and checking the appropriateness of the scales, we have conducted a factor analysis in SPSS with the potential ordinal scales. The potential state scales were used because the factor analysis delivers better results than the factor analysis of the current state scales. In all columns where we have a 0.3 or higher means that we can keep these scales. Also, when looking at the Anti-Image correlation we needed a 0.5 or higher for the number of correlations of each variable with itself. Subsequently, this is the highest possible correlation with another item. So, all the items that do not correlate with something else are essential components (principles) of CBL because they do not belong to something we are already used to in education. Therefore, as some items that do not correlate with any other items it is reasonable and logical why these do not. This is because it is new to other educational practices/pedagogies.

Furthermore, the outliers were checked upon in SPSS and one could identify multiple outliers for both the current and potential state. Nonetheless, the decision was made to keep the outliers into the participant list and responses retrieved. This decision is based on the reason that we measure something that is new (CBL) compared to already existing educational practices. Moreover, it is essential to mention that we measure facts and not emotions or feelings.

Finally, after adjusting the scales and coming up with new scales the following coding of questions related to the CBL components were decided upon (‘flexible learning path’, ‘stakeholder involvement’, ‘enterprise skills’, ‘real-world experience’ and ‘teacher role’):

FLP1	Students can determine the pace of their own learning process…
FLP2	Students have a say on how they will be assessed
FLP3	The content is adjusted to the individual areas of interest of students
FLP4	Students themselves document their entire learning process for assessment purposes
FLP5	We offer time to let students (re-) consider different perspectives to craft thoughtful solutions
FLP6	Students develop their own learning outcomes/goals in line with the existing Program-level Intended Learning Outcomes (PILO's)
FLP7	We deviate from the planning when students are interested in lateral aspects of the course content, even if that means not everything that was planned can be done
FLP8	We adjust the pace of the learning activities whenever necessary, allowing students to process what they have learned
FLP9	Students are part of the research community
FLP10	Students choose the key learning materials themselves
FLP11	We do not intervene if students make mistakes in critical parts during their learning process
ST1	External stakeholder are co-assessors…
ST2	External stakeholders are actively engaged in critical parts of the learning process/activity
ST3	Students demonstrate their intermediate results to a wider audience…
ST4	Students are part of a learning community
ST5	The educator provides students with a variety of learning partners within as well as outside the campus
ST6	Students develop knowledge and skills through experience…working with industry experts…
ST7	The solution/conclusion reflects the ethical considerations of the stakeholders affected by the solution

ST8	Students can explore a location outside the University that is central to the subject matter
RW1	Students use the latest technology and methods within their field of study
RW2	Students take risk and experiment to critically explore and assess the boundaries of their learning object
RW3	Students build a prototype/solution
RW4	Students test the prototype/solution under real life conditions, evaluate and optimize it
ES1	Students work in multidisciplinary teams of students with different educational backgrounds
ES2	Students discuss ongoing contradicting viewpoints lingering within and outside the course discipline
ES3	As part of the feedback sessions, students are asked to raise critical questions
ES4	Student group formation is based on their own specific qualities such as skills, personal traits, background knowledge, interests, etc
TR1	The educator act as a coach during the learning process rather than being a lecturer
TR2	Educators are considered senior partners in the learning process
TR3	This course/module is continuously updated with the latest innovative didactic methods
TR4	We have reserved an additional workspace for students to use freely whenever they need it
TR5	Students solve actual complex/wicked problems provided by the real-world
TR6	We assess student achievements throughout the learning process rather than the end-result only
TR7	A substantial part of the learning activities is dedicated to students reflecting on the learning process
TR8	The content is acquired through peer learning
TR9	We specifically assess transferable skills not specific to the domain, such as critical thinking, collaboration, communication

Table 2: New scales and coding of the survey questions

The same coding is also done for the potential items.

4.2. General Outcomes

1) The number of male respondents (49) is higher compared to the female (21) respondents. So, there are more responses from male (70%) than from female (30%) course and module coordinators.
2) Next, years of experience in teaching in higher education of the course and module coordinators were divided in the following categories: 5 or less years=little experience; 6-15 years= average experience; and more than 16 years= experienced (course or module coordinator). So, 58.3 % of all course and module coordinators are experienced, 29.2% of them have an average

experience, and 12.5% have little teaching experience in higher education. Thus, most of the course and module coordinators that responded are experienced teachers in higher education.

3) In general, respondents rather referred to courses (44) than to modules (26). So, more answers are collected regarding the courses taught compared to existing modules. Due to the higher response rate for the category ‘courses’ it is most probable that these outcomes are reliable.
4) Another general information regarding the responses is the type of faculty: BMS (21) EEMCS (16) ET (15) TNW (12) ITC (3)
5) Next, latest involvement in the course/ module were distributed as following, 2019-2020 (94.4%) 2018-2019 (2.8%) 2017-2018 (1.4%) Older (1.4%) Also one coordinator rated the course/module from the year 2020-2021.
6) A further general information retrieved from the study is the study program the courses or modules were positioned in. So, 45.8% of the courses and modules were from the Bachelor program and 47.2% from the Master program. Hence, an evenly distributed representation of both programs can be retrieved from the study. The minority was represented with 1.4% Minor program and 5.6% from the Pre-Master program.
7) Another measure was the study year the courses and modules took place in. So, the majority of the courses and modules that were rated took place in the 1st year (56.9%) of the program. Followed by the 2nd year (27.8%) and finally with a low percentage (13.9) in the 3rd year of the program.
8) Most of the course and module coordinators (95.8%) (co-) designed the course/module they rated for this study.
9) An important aspect is that most of the courses/modules involved groupwork of the students (81.9%).

4.3. Comparison Current State VS Potential State

4.3.1. Comparison of the averages: current vs potential state

The following section describes the statistical results and findings. First off, to start with a comparison, as Figure 4 and Figure 5 indicate, the average of the whole current situation is 2.6321 and the average of the whole potential situation is 3.1783, difference of 0.7 points. So, the average of the whole potential situation is higher than the current whole current situation. Course and module coordinators gave a higher score, meaning seeing a higher potential for implementing CBL principles (innovative educational practices), for the courses and modules than what already exists at the current situation.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Mean of the Current State	72	1.03	4.03	2.6321	.76237
Valid N (listwise)	72				

Figure 4: The average of the whole current situation

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Mean of the Potential State	72	1.36	5.00	3.1783	.79157
Valid N (listwise)	72				

Figure 5: The average of whole potential situation

Furthermore, the average of each CBL components/principle can be looked at in detail. Therefore, new scales were created in SPSS to bundle all items together which belong to a CBL principle/component. Also, when comparing each CBL component in the current and potential state one can see that the mean scores are higher in the potential situation (See Figure 6 & Figure 7). Especially, the highest difference is shown for the CBL principle "Enterprise skills" with 0.7 points and the lowest difference for "Teacher role" with 0.3 points. So as previously mentioned, course and module coordinators saw higher potential for implementing CBL principles for the courses and modules than what already exists now.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Current Stakeholder involvement	72	1.00	5.00	2.3517	1.08725
Current Flexible learning path	72	1.00	4.09	2.3191	.77210
Current Real world experience	72	1.00	5.00	2.9306	1.07568
Current Enterprise skills	72	1.00	5.00	2.8785	.98492
Current Teacher role	72	1.11	4.33	3.0328	.75518
Valid N (listwise)	72				

Figure 6: The average of the current CBL principles/components

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation

Potential Stakeholder involvement	72	1.00	5.00	2.9613	1.05580
Potential Flexible Learning path	72	1.18	5.00	2.9609	.84345
Potential Real World Experience	72	1.00	5.00	3.4329	1.13932
Potential Enterprise_skills	72	1.50	5.00	3.5810	1.00857
Potential Teacher role	72	1.33	5.00	3.3627	.84187
Valid N (listwise)	72				

Figure 7: The average of the potential CBL principles/components

Next, 3 categories were created in SPSS for determining if a CBL component/principle in the current and potential situation scored below, on, or above the average (both scales ranged from 1-5). For this the average scores of each CBL principle/category in SPSS was taken. Subsequently, it was decided upon the following categories: 1-2.33= below average; 2.34-3.67= on average; 3.68-5= above average. This description helps to describe which CBL component/principle gained a significant meaning. So, the CBL principle 'current stakeholder involvement' had the highest number (40 responses), answering with the score below the average (See Figure 8).

Cat_AV_C_ST

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below average	40	55.6	55.6	55.6
	On average	22	30.6	30.6	86.1
	Above average	10	13.9	13.9	100.0
	Total	72	100.0	100.0	

Figure 8: Categories averages of Current stakeholder involvement

Next, the CBL principle 'current teacher role' had the highest number (43 responses), answering with the score 'on the average' (See Figure 9).

CAT_AV_C_TR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below average	12	16.7	16.9	16.9
	On average	43	59.7	60.6	77.5
	Above average	16	22.2	22.5	100.0
	Total	71	98.6	100.0	
Missing	System	1	1.4		
Total		72	100.0		

Figure 9: Categories averages of Current teacher role

And finally, the CBL principle 'potential enterprise skills' had the highest number (36 responses), answering with the score above the average (See Figure 10). This confirms the previous finding of course and module coordinators giving a higher score and seeing higher potential in courses and modules for 'enterprise skills'.

CAT_AV_P_ES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below average	8	11.1	11.1	11.1
	On average	28	38.9	38.9	50.0
	Above average	36	50.0	50.0	100.0
	Total	72	100.0	100.0	

Figure 10: Categories averages of potential enterprise skills

Moreover, the following trend can be observed, while the course and module coordinators gave a score for the existence of the CBL principles 'below and on average' in the current situation, in the potential situation the score increased towards the 'on average and above the average'.

4.3.2. Test of Association: 'Years of experience and CBL components'

In the following section, the results of the tests of association between the independent variable 'course/module coordinator's years of teaching experience' and the dependent variables 'CBL components' in the current state are represented. Only significant results are further explained in here.

Status Quo/current state

Next, test of association was undertaken to see if there is a correlation between the independent variable 'years of experience' and the dependent variables 'all the current state CBL components'. Subsequently, for the analysis a *One-way Anova* and an *Independent samples Kruskal Wallis test* were run in SPSS. Moreover, we looked at the Spearman's rho coefficient, the Chi square and p-value. In general, after running the test of association, one found several weak to moderate negative correlations between the variables. Overall, nine correlations were found, but after checking the chi square value (predetermined p-value of < 0.05), one ends up with five significant weak to moderate negative correlations in total. Furthermore, we predetermined H0: The distribution of the DV (current state CBL components) is the same across categories of the IDV (years of experience). The results show that there is a difference and one can reject the H0. So, there are significant weak to moderate negative correlations between the independent variable 'years of experience' and the dependent variables 'C_ST3'; 'C_ST4'; 'C_ST6'; 'C_FLP4'; 'C_ES3' (See meaning for these in Table 2).

With an increase of the coordinator's years of experience, the less stakeholders are involved in the learning process. To be more specific, the more the years of experience, the less students demonstrate their intermediate results to a wider audience…(ST3); the less students are part of a learning community (ST4); and the less students develop knowledge and skills through experience…working with industry experts… (ST6). (See Appendix D for list of tests of association). Also, the more the years of experience, the less students themselves document their entire learning process for assessment purposes (FLP4); and the less, as part of the feedback sessions, students are asked to raise critical questions (ES3).

All in all, the following general trend can be observed for the current state. So, there is a trend towards course and module coordinators who have longer years of teaching experience, being less likely to use all CBL components. (See Appendix E: (8.5.2.) for the spearman's rho correlations output 'years of experience' against 'the current CBL components'). This general trend is also illustrated in the following scatterplot (See Figure 11). This scatterplot indicates the 'years of teaching experience' against the mean of the 'current state CBL components'. Furthermore, one can find all detailed scatterplots in Appendix E (8.5.1). Those scatterplots indicate the 'years of teaching experience' against each CBL component such as 'stakeholder involvement', 'flexible learning path', 'real world experience', 'enterprise skills' and 'teacher role'. One can see that the number of teachers with higher teaching experience increases who are less likely to use the CBL components. So, with an increase in teaching experience there is a decrease in the actual use the CBL components.

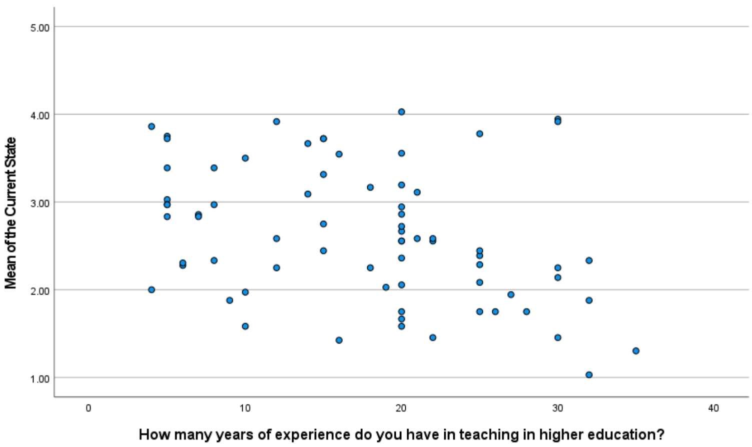


Figure 11: Scatterplot 'years of teaching experience' against the mean of the 'current state CBL components'

The following histogram (See Fig. 12) does also summarize the previously observed trend. In here one can see that the variable 'teaching experience (CEX)' is divided into three categories 'low' ('little experience' 5 or less years), 'medium' ('average experience' 6-15 years) and 'high' ('experienced' more than 16 years). So, 'teaching experience (CEX)' is illustrated against the whole 'current state'. Thus, the higher or more the teaching experience, the less likely a module and course coordinator is open to apply components of CBL.

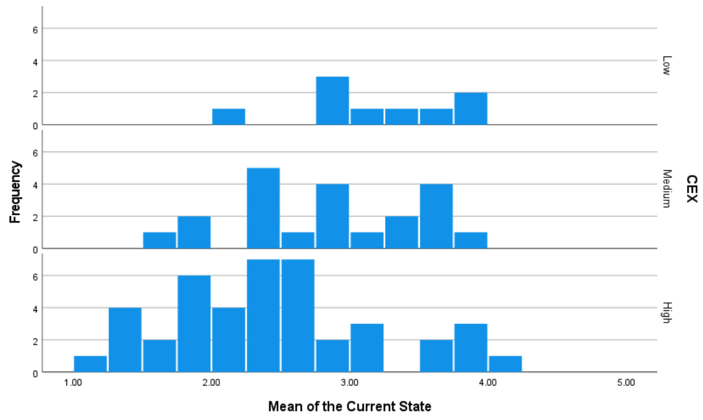


Figure 12: Histogram of ‘teaching experience (CEX)’ against the whole ‘current state’.

The Potential state

As already done in the previous section, the results of the tests of association between the independent variable ‘course/module coordinators years of teaching experience’ and the dependent variables (CBL components) in the potential state are represented. Only significant results are further explained in here.

First, test of association was undertaken to see if there is a correlation between the independent variable ‘years of experience’ and the dependent variables ‘all the potential state CBL components’. In consequence, for the purpose of analysis a *One-way Anova* and an *Independent samples Kruskal Wallis test* were run in SPSS. More specifically, we looked at the Spearman’s rho coefficient, the Chi square and p-value. So, after running the test of association, one found some weak to moderate negative correlation between the variables. In general, five correlations were found, but after checking the chi square value (predetermined p-value of < 0.05), one ends up with three significant weak to moderate negative correlations in total. Next, H0 was predetermined as the following. H0: The distribution of the DV (potential state CBL components) is the same across categories of the IDV (years of experience). The results show that there is a difference and one can reject the H0 for three CBL components. So, there are significant weak to moderate negative correlations between the independent variable ‘years of experience’ and the dependent variables ‘P_FLP10’; ‘P_FLP6’ and ‘P_RW2’ (See meaning for these in Table 2).

With an increase of the coordinator’s years of experience, the less students would choose the key learning materials themselves (‘P_FLP10’); the less students would develop their own learning outcomes/goals in line with the existing Program-level Intended Learning Outcomes (PILO's) (‘P_FLP6’) and the less students would take risk and experiment to critically explore and assess the boundaries of their learning object (‘P_RW2’). (See Appendix D for list of tests of association).

Another observation is that course and module coordinators with 10-20 years of teaching experience are more open to use all CBL components (See Fig. 13: Scatterplot 'years of teaching experience' against 'potential state CBL components').

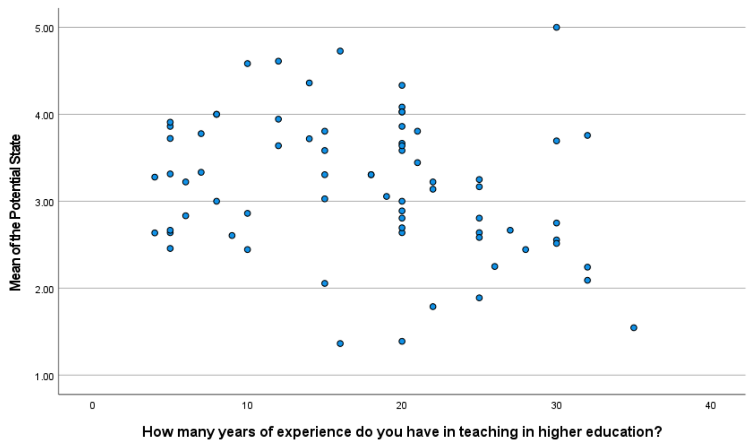


Figure 13: Scatterplot 'years of teaching experience' against 'potential state CBL components'

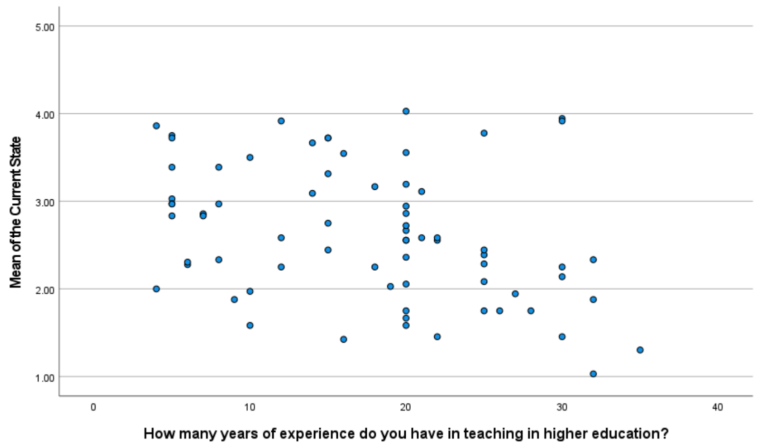


Figure 14: Scatterplot 'years of teaching experience' against 'current state CBL components'

On one hand, one can still observe the general trend of the more years of teaching experience a course and module coordinator have, the less likely he/she is open to applying components of CBL. On the other hand, when comparing the two scatterplots (Fig. 13 and 14) of the current and the potential state, one can see that course and module coordinators indicated a slightly higher likelihood and openness to use all CBL components in the potential state.

4.3.3. Comparison: use of CBL components across faculties in the current vs potential state

Current state

In the following section the use of the CBL components across the faculties of the UTwente in the current state gets illustrated and explained. So, the independent variable is the 'faculties' at the UTwente and the dependent variable are 'all the CBL components'. So, each current CBL component, more specifically the mean of each CBL component 'current stakeholder involvement', 'current flexible learning path', 'current real-world experience', 'current enterprise skills' and 'current teacher role', is shown against each different type of faculty (BMS, EEMCS, ET, TNW, ITC) across the UTwente (See Fig. 15). Subsequently, one can observe the use of the CBL components across the faculties of Social Sciences and Technical Sciences at the UTwente. The following observations can be made. First, from the perspective of course and module coordinators, the faculty of 'ITC' is currently using CBL components more compared to the other faculties. Course and module coordinators of the faculty of 'ITC' give higher rates regarding using CBL components now in comparison to the other faculties. On the contrary, the EEMSC faculty indicates the least use of CBL components compared to the others. Thus, the EEMCS faculty 'slightly' makes use of CBL components within the faculty. Next, the course and module coordinators of all three faculties ET, TNW and BMS gave similar scores from slight to moderate use of CBL components. Furthermore, all faculties agree on a similar score regarding the use of the CBL 'current real-world experience'. Next, according to course and module coordinators the CBL component which is used the least currently is the 'current flexible learning path'. Contrarily, 'current teacher role' is the CBL component that is mostly used. All in all, except from the ITC faculty, all faculties indicate mainly 'slight to moderate' use of CBL components. Nevertheless, none of the faculties indicate a 'to the full extent' use of CBL components.

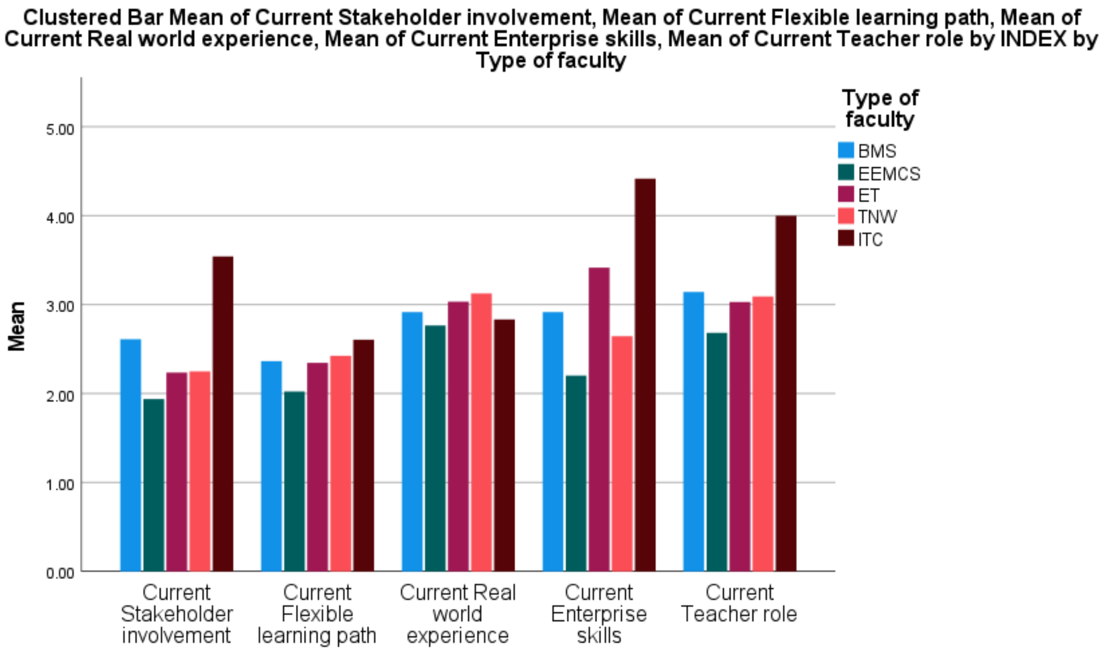


Figure 15: Bar chart: 'Faculties' across the UTwente against the 'mean of each CBL component' 'current stakeholder involvement', 'current flexible learning path', 'current real-world experience', 'current enterprise skills' and 'current teacher role'

Potential state

In this section the openness towards using the CBL components within the faculties of the UTwente will be explored from the perspective of course and module coordinators. First off, a general observation when comparing the potential state with the current state, more specifically explored in the previous section, the following can be said (See Fig. 16). From the perspective of course and module coordinators, all faculties across the UTwente are more open towards using CBL components. Moreover, they see the potential within the faculties to apply the CBL components rather than what they use at the current state. So, there is room for improvement. Nevertheless, overall, from the perspective of course coordinators, there is room for improvement within the faculties to reach a 'moderate to considerable' use of CBL components in the future. Furthermore, it is important to note that the faculty of 'EEMCS' sees the least room for improvement which is probably due to scoring low in the current state. Nonetheless, in general the faculty of 'EEMCS' sees room for improvement across the use of all CBL components. Next, the faculty of 'ITC' which scored high in the current state, does only see slight room for improvement in the use of the CBL components 'stakeholder involvement', 'real world experience' and 'flexible learning path'. According to the course and module coordinators there is no room for improvement within the 'ITC' faculty for the CBL components 'enterprise skills' and 'teacher role'. Another important observation is that in the potential state course and module coordinators, except for the 'ITC' faculty, see the most room for improvement for the CBL component 'enterprise skills'. Contrarily, all course and module coordinators see the least room for improvement for the CBL component 'teacher role'.

All in all, it went from the current state with a 'slight to moderate' use of CBL components to course and module coordinators openness towards a 'moderate to considerable' use of CBL components with room for improvement in the potential state.

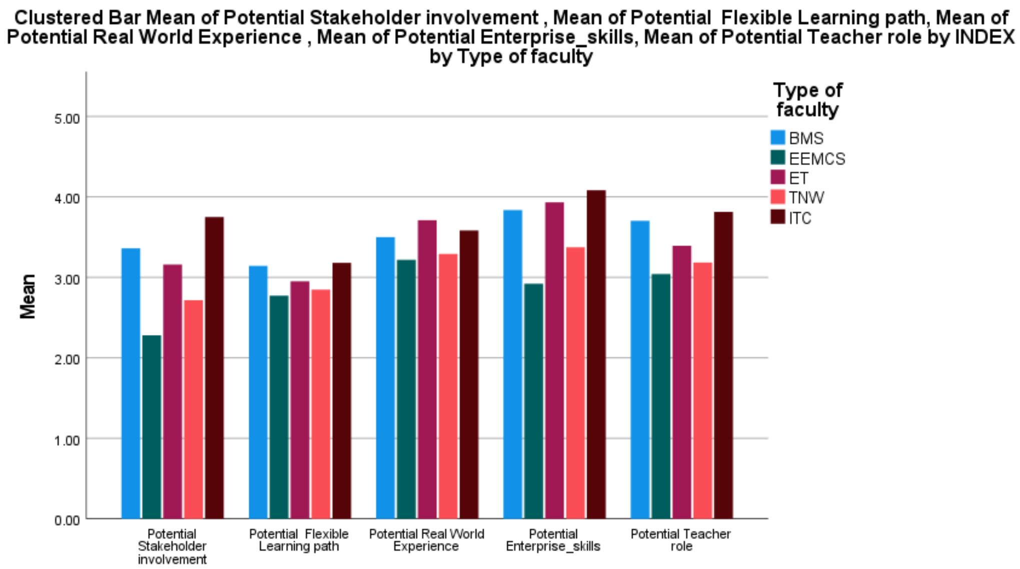


Figure 16: Bar chart: 'Faculties' across the UTwente against the 'mean of each CBL component' 'potential stakeholder involvement', 'potential flexible learning path', 'potential real-world experience', 'potential enterprise skills' and 'potential teacher role'

4.3.4. Comparison: use of CBL components across the study programs (bachelor vs master) in the current vs potential state

Current state:

In this section the use of the CBL components across the study programs of the UTwente in the current state gets further explored. Due to low response rate the minor program got excluded from the analysis in SPSS. So, there is the distinction between the two study programs, ‘Bachelor’ and ‘Master’ program. The following bar charts (See Fig.17) illustrate the study programs ‘bachelor’ and ‘master’ against each CBL component on a self-created ordinal scale ranging from ‘below average’ (1-2.33), ‘on average’ (2.34-3.67), to ‘above average’ (3.68-5). According to the perspective of course and module coordinators the study program that makes more use of the CBL components is the ‘master study program’. Nonetheless, with one exception of the CBL component ‘real world experience’ where the ‘bachelor study program’ scores higher on the ‘average scale’ and the master study program scores higher on the ‘below average scale’. However, both study programs score similar on the ‘above average scale’. Therefore, both study programs are doing quite similar in using this CBL component. Furthermore, the ‘bachelor study program’ is currently doing poor in using the CBL components ‘flexible learning path’ and ‘stakeholder involvement’. All in all, the ‘master study program’ scores mainly higher on the above average scale compared to the bachelor study program.

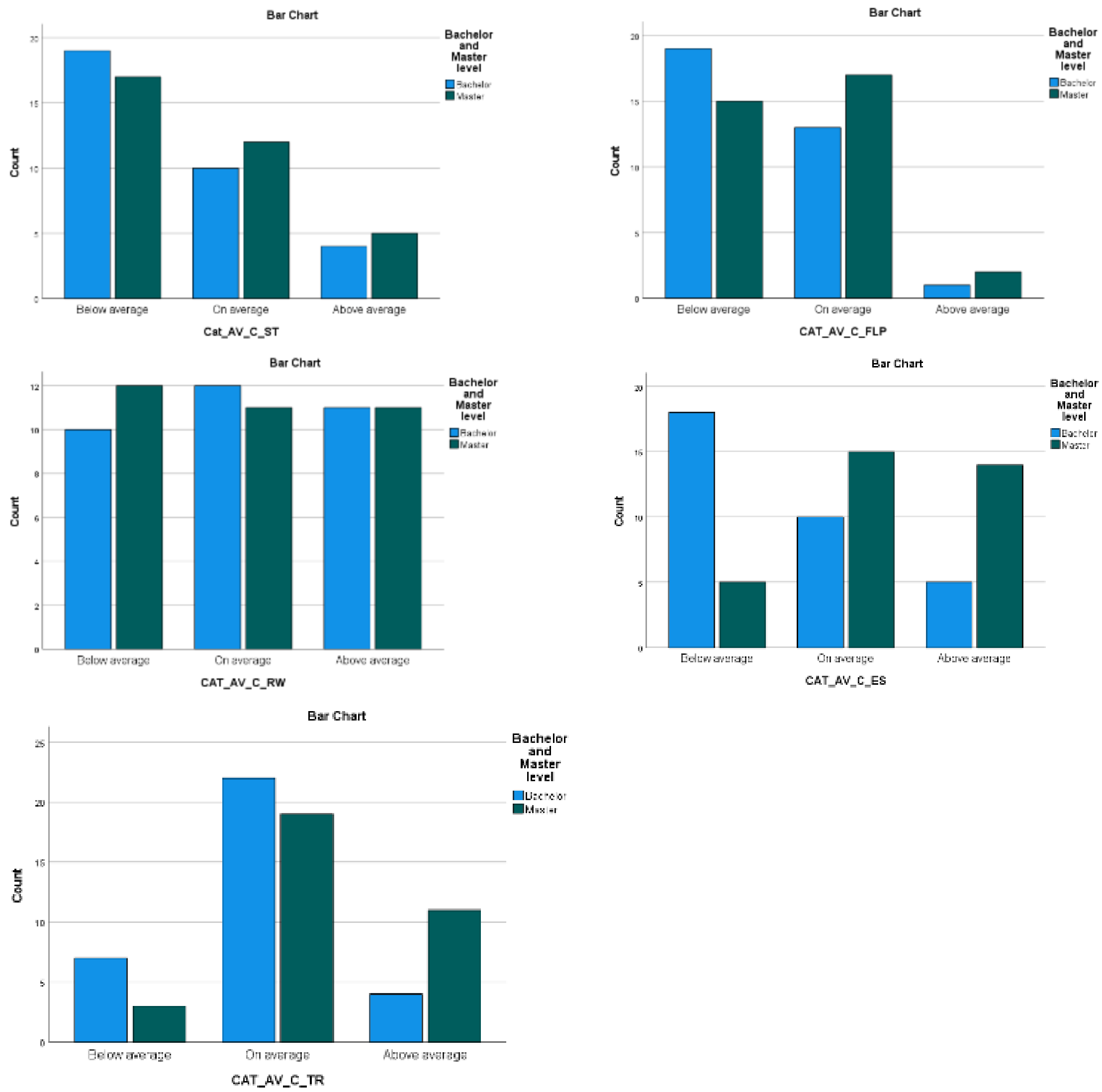


Figure 17: Bar charts: the study programs ‘bachelor’ and ‘master’ against each CBL component on ordinal scale ranging from ‘below average’ (1-2.33), ‘on average’ (2.34-3.67), to ‘above average’ (3.68-5) in the current state

Potential state

In this section the openness towards using the CBL components across the study programs of the UTwente in the potential state gets elaborated on. The following bar charts illustrate how open each study program across the UTwente is to apply the CBL components in the future and how much potential each study program has (See Fig.18). According to the perspective of course and module coordinators, there is a general trend towards both study programs being more open and seeing the potential of the study programs to apply the CBL components in the future. Nonetheless, the master study program scores also in the potential state higher on the above average scale than the bachelor study program.

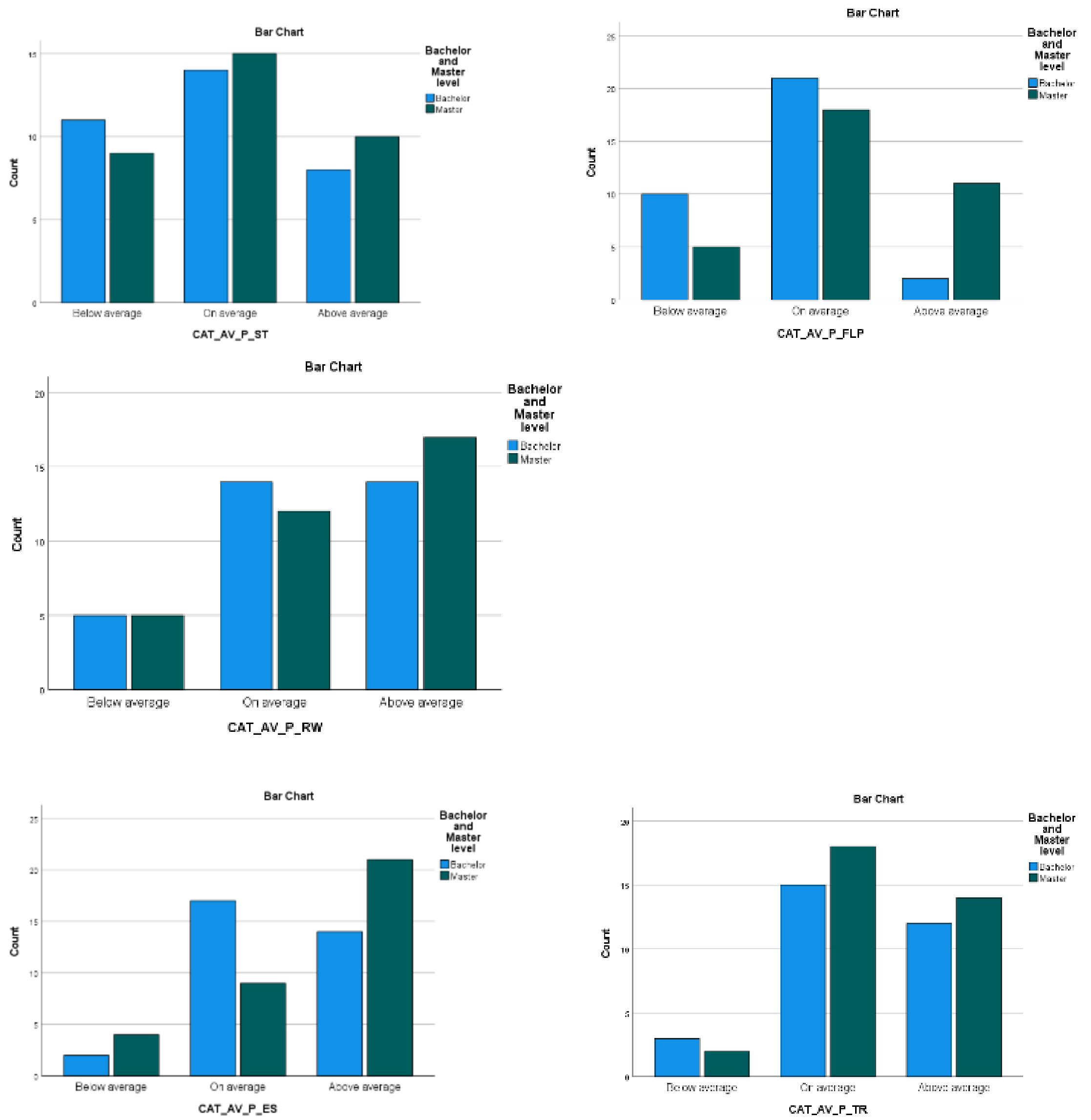
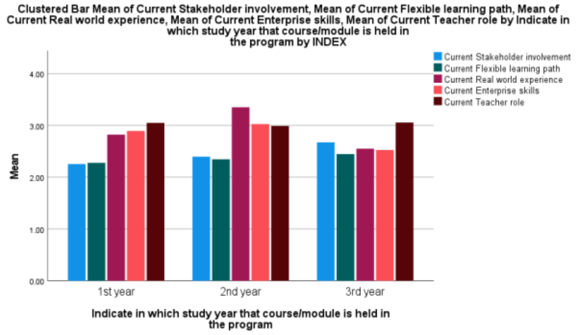


Figure 18: Bar charts: the study programs ‘bachelor’ and ‘master’ against each CBL component on ordinal scale ranging from ‘below average’ (1-2.33), ‘on average’ (2.34-3.67), to ‘above average’ (3.68-5) in the potential state

4.3.5. Comparison: use of CBL components across the study years (1st to 3rd) in the current vs potential state

Another independent variable used was ‘study year’ ranging from 1st year to 3rd year of study against the dependent variable ‘all CBL components’ (Fig. 19). So, in the current state across all study years there is a ‘slight to moderate’ use of the CBL components, while in the potential state there is mainly room for ‘moderate’ use of CBL components in the future.

Current state:



Potential state:

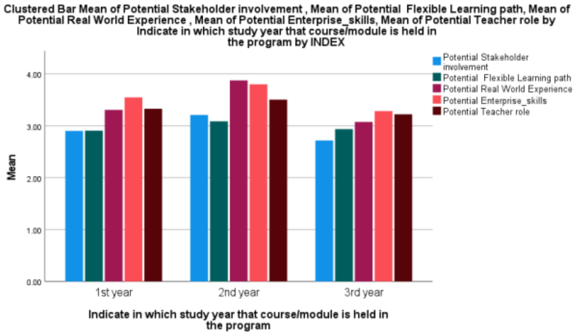


Figure 19: Bar charts: 'study year' ranging from 1st year to 3rd year of study against 'all CBL components' in the current vs potential state

4.4. Correlation between the current and potential state

A linear regression analysis was executed with the new scales created of the current and potential state (i.e., current stakeholder involvement). In here it is important to note that with this analysis the aim is to see if there is a prediction, because one needs to know if the current state predicts anything about the potential state. So, one does not want to know if the current state correlates with the potential state because one cannot measure the correlation of something, in here the potential state, which did not happen yet. Therefore, in here we measure to what extent the current state predicts the potential state with the help of the linear regression analysis (See Appendix E for complete linear regression analysis outputs). After the execution of the linear regression analysis one can make the following observation. All in all, there are weak to moderate correlations between the current state and the potential state. This means that there are weak to moderate correlations between how a course or module coordinator rates in the current state and how they do in the potential state. It can be also said that the extent to which the current state predicts the potential state is weak to moderate.

Example of one correlation executed in SPSS (See Appendix E for complete linear regression analysis):

Linear regression analysis with the new scales created

1. Independent variable: Current Stakeholder Involvement
2. Dependent: Potential Stakeholder Involvement

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Stakeholder involvement	2.9613	1.05580	72
Current Stakeholder involvement	2.3517	1.08725	72

Correlations

		Potential Stakeholder involvement	Current Stakeholder involvement
Pearson Correlation	Potential Stakeholder involvement	1.000	.664
	Current Stakeholder involvement	.664	1.000
Sig. (1-tailed)	Potential Stakeholder involvement	.	.000
	Current Stakeholder involvement	.000	.
N	Potential Stakeholder involvement	72	72
	Current Stakeholder involvement	72	72

Measuring to which extent current state predicts potential state. We have a moderate correlation between the current stakeholder involvement variable and potential stakeholder involvement variable 0.664, the correlation is significant so a correlation between how a person rates on the current and how he/she rates on the potential

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.664[a]	.441	.433	.79488	.441	55.261	1	70	.000

a. Predictors: (Constant), Current Stakeholder involvement

b. Dependent Variable: Potential Stakeholder involvement

44.1% of the variability in potential stakeholder involvement can be accounted for by current stakeholder involvement

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound

1	(Constant)	1.444	.225		6.434	.000	.997	1.892
	Current Stakeholder involvement	.645	.087	.664	7.434	.000	.472	.818

a. Dependent Variable: Potential Stakeholder involvement

Unstandardized coefficient 0.645

What one unit increase in current stakeholder involvement how much extra can we expect on average a person to score higher in potential stakeholder involvement. So, when current stakeholder involvement increases by one unit, we can expect 0.645 increase in potential stakeholder involvement. Intercept= 1.444 is the value of y so the value of potential stakeholder involvement when x is 0, So, when you have 0 (in our case 1 for not at all) in current stakeholder involvement you have a positive increase of 1.444 in potential stakeholder involvement.

4.5. Observation of Individual Cases

When looking at the courses and modules individually that scored the highest in the current or potential state one can make the following observation. Due to personal privacy issues, one cannot name the exact course that is most innovative. However, one can make statements about the faculty, study program and year the course took place in.

So, on one hand, from the perspective of the course coordinator the course that is currently using most of the CBL components is a course from the BMS faculty and takes place within the one year of a master study program. On the other, from the perspective of the course coordinator the course with the most room for improvement to apply CBL components in the future and is open towards using it is a course from the EEMCS faculty and is executed in the first year of the two years long master study program at the UTwente.

5. Discussion

During this section an interpretation and analysis of the results identified in the previous section will follow. All the statements are based upon the statistics illustrated in chapter 4: Results. The aim in this paper was to identify from the perspective of course and module coordinators the extent to which educational innovative practices such as CBL is already used at the current state and if the courses/modules have the potential to implement CBL across the courses and modules of all faculties at the UTwente in the future. Therefore, an instrument was needed to measure the status quo and the potential for change which is the aim of this paper. Subsequently, with the help of the literature review of the CBL concept, experts knowledge and pre-tests, a survey instrument was developed. The framework for this survey instrument is based upon the following theoretical concepts. First, the curriculum spiderweb of Van den Akker (2003). Second, the CBL components that are suggested by various research papers such as Malmqvist et al. (2015). So, the closed-structured questionnaire (See Appendix C) is an initial attempt to measure the status quo and the potential for change implementing CBL in the ongoing curricula.

By applying the survey instrument for the case of the UTwente the following got discovered for the current and potential state. First off, comparing the averages of the current to the potential state. As the average of the whole potential situation is higher than the current whole current situation, one can assume that the courses and modules have more potential and room to implement innovative educational practices (such as CBL) from the perspective of course and module coordinators. However, according to them the full potential is not exploited to its full extent at the current situation. This means that there is room for change. This statement gets also confirmed when comparing each CBL component from the current state against the potential situation one can conclude that, from the perspective of course and module coordinators, there is a higher potential to implement CBL principles for the courses and modules than what already is used at the current state.

To become more specific regarding each CBL component, one can say that, from the perspective of course and module coordinators, there is more room for change for the CBL principle “Enterprise skills” throughout the courses and modules across the faculties of the UTwente. Meaning that currently not enough is done towards the development of ‘enterprise skills’. The courses and modules have the potential, but it is not fully exploited. Therefore, more work needs to be done towards that issue and there is room for change. However contrarily, according to the course and module coordinators the CBL principle ‘Teacher role’ across all other CBL principles is nearly exploiting its full potential already in the current situation. So, this requires the least work and effort to be done, which also means the courses and modules do not have much room for change in here. Subsequently, this shows also how open the course and module coordinators are towards the change of this CBL component in the future.

By looking at the results of the categories averages ‘below’, ‘on’ and ‘above the average’ it confirms the above that the CBL principle ‘teacher role’ is currently doing quite well with course and module coordinators giving the highest score for the category ‘on the average’. However contrarily, another observation reveals that the weakest CBL principle at the current situation is ‘stakeholder involvement’ with the score being the highest in the category ‘below average’. Meaning that this CBL principle is not doing well at the current situation. Nonetheless, the course and module coordinators do not see the highest potential for change for this CBL component ‘stakeholder involvement’. But instead, according to their perspective, the courses and modules have more potential for the CBL principle ‘enterprise skills’ by giving the highest score to the category ‘above average’. Consequently, this confirms again the previous observation of courses and modules having the highest potential for change regarding the CBL principle ‘enterprise skills’. So, what can be said is that there is more room for change for the CBL principle ‘enterprise skills’ throughout the courses and modules from the perspective of course and module coordinators.

All in all, in general the trend shows that there is an increased potential for implementing all the CBL principles throughout the courses and modules. So, while the existence and use of the CBL principles at the current state is rather ‘below and on average’, the courses and modules have a potential for implementing the CBL principles in the future scoring more ‘on average and above the average’.

Furthermore, the linear regression analysis of the current and potential state revealed that the extent to which the score of course and module coordinator in the current state predicts the score in the potential state is weak to moderate. So, the current state is a weak to moderate predictor of the potential state.

Next, as documented in the results section the test of association of various independent variables got projected against the dependent variables of the ‘CBL components’ in the current vs the potential state. The first independent variable is ‘years of teaching experience’ against the dependent variables ‘CBL components’. For the current situation it was found that there are five significant weak to moderate negative correlations. More specifically, it was found that with an increase of the coordinator’s years of teaching experience, the less the less students demonstrate their intermediate results to a wider audience…(ST3); the less students are part of a learning community (ST4); and the less students develop knowledge and skills through experience…working with industry experts… (ST6), the less students themselves document their entire learning process for assessment purposes (FLP4); and the less, as part of the feedback sessions, students are asked to raise critical questions (ES3). Meaning also that in here the CBL component ‘stakeholder involvement’ prevails as the least used at the current state the more a coordinator’s years of teaching experience is. On the other hand, in the potential state the following three significant weak to moderate negative correlations were found. So, with an increase of the coordinator’s years of experience, the less students would choose the key learning materials themselves (‘P_FLP10’); the less students would develop their own learning outcomes/goals in line with the existing PILO's ('P_FLP6') and the less students would take risk and experiment to critically explore and assess the boundaries of their learning object ('P_RW2'). Meaning, that with an increase of the coordinator's teaching experience, they are less open towards using, especially the CBL component 'flexible learning path', in the future. This shows that the more the teaching experience, the less open they are to let the students decide upon their learning process. However, it was also found that the group of coordinators with 10-20 years of teaching experience are more open to use all CBL components in the future. Nonetheless, the following general trend can be stated for both, the current and potential state, that with an increase of the years of course and module coordinator's teaching experience, the less likely and open they are to use all CBL components.

Afterwards, an overview of the current use of the 'CBL components' across the 'faculties' reveal that, from the perspective of course and module coordinators, the faculty of 'ITC' is currently using the CBL components quite well compared to the other faculties. Contrarily, the faculty of 'EEMCS' is currently doing the worst in applying the CBL components. Moreover, while the CBL component 'teacher role' is used the most compared to the other CBL components, the CBL component 'flexible learning path' is used the least. So, the EEMCS faculty and the CBL component 'flexible learning path' are doing quite poor at the current state. Furthermore, the faculty of 'BMS', 'ET' and 'TNW', and the CBL component 'real world experience' reach a similar use at the current situation. In general, apart from the ITC faculty, there is 'slight to moderate use' of the CBL components at the current state across the faculties, whereby it is crucial to mention that a use 'to the full extent' was not reached. In the potential state, course and module coordinators across all faculties are more open indicating to be able to reach a 'moderate to considerable' use of the CBL components in the future. So, there is a transition from the current 'slight to moderate use' of the CBL components to a possible 'moderate to considerable' use in the future. Furthermore, while the ITC faculty sees the least room for improvement and especially not for the CBL components 'enterprise skills' and 'teacher role'. Also, all other faculties see the least room for improvement for the CBL component 'teacher role. This indicates the least openness towards changing the role of the teacher according to the CBL concept. Contrarily, except for the ITC faculty, course and module coordinators see the most room for improvement for the CBL component 'enterprise skills' which also indicates their openness towards the use of this CBL component.

Turning to use of the 'CBL components' across the 'study programs' of the UTwente in the current and potential state, the following was found. Both study programs 'bachelor' and 'master' are currently using the CBL component 'real-world experience' at a similar rate. Furthermore, the 'bachelor' study program is not doing well in using the CBL components 'flexible learning path' and 'stakeholder involvement'. Consequently, the 'master' study program is using currently more of the CBL components compared to the 'bachelor' study program. In general, in the potential state compared to the current state both, 'master' and 'bachelor' study program course and module coordinators are more open and see the potential of both study programs to apply CBL components in the future. Nevertheless, again the ‘master’ study program is more open and sees more potential in using the CBL components in the future compared to the ‘bachelor’.

Next, the use of the ‘CBL components’ across the various ‘study years’ reveals a current ‘slight to moderate’ use of the CBL components and a potential ‘moderate’ use in the future. Subsequently, there is again the trend towards course and module coordinators seeing more potential for all study years to use all CBL components in the future.

Another issue to mention is although one looked at the individual courses and modules and found which one was the most innovative and has the most potential, this paper will not consider the individual cases due to generalizability and privacy issues.

To summarize all the following points can be made. From the perspective of course and module coordinators, the general trend is towards courses and modules across the UTwente having a moderate potential to use CBL components in the future. So, mainly moderate room for improvement is available. This also indicates that course and module coordinators are moderately open towards change. Next, in general all faculties and types of study programs currently are using the CBL component ‘real-world experience’ at a similar rate, meaning the course and module coordinators agree on a nearly same use of that CBL component. Furthermore, it can be said that after the CBL component ‘enterprise skills’, ‘stakeholder involvement’ and ‘flexible learning path’ require further attention due to not doing well at the current state.

All in all, considering all the results from the previous section one can draw the following statements and conclusion. From the perspective of course and module coordinators, the courses and modules from the ‘ITC’ faculty and the ‘master’ study program score the highest on the CBL component at the current state. Furthermore, the CBL component that is mostly used in the current state is the ‘teacher role’ CBL component. The CBL component that is used the least at the current state is the ‘enterprise skills’ CBL component. So, in conclusion, courses and modules from the ‘ITC’ faculty and those taking place in the ‘master study’ program are the most innovative ones at the current state.

Contrarily, from the perspective of course and module coordinators, the courses and modules from the ‘EEMCS’ faculty and the ‘bachelor’ study program score the lowest on the CBL component at the potential state. Moreover, the CBL component ‘enterprise skills’ offers the most room for improvement and course/module coordinators are open to use it in the potential state. One the other hand, the CBL component ‘teacher role’ offers the least room for improvement at the potential state and course/module coordinators are less open towards improving it in the future compared to the other CBL components. This also means course and module coordinators are less open to change the ‘teacher role’ in the future. To sum up, the courses and modules from the ‘EEMCS’ faculty and those taking place in the ‘bachelor’ study program are the least innovative ones at the potential state.

6. Conclusion

This paper aimed to give an overview of to what extent CBL is currently in use and what is the potential for improvement, but also openness towards changes in the future at an institutional level. By reviewing various literature regarding innovative educational practices, innovation in education/curricula and the new concept of CBL, this paper developed a framework of giving an overview of each of the CBL components (Malmqvist et al., 2015 and many more) being assigned to the curriculum spiderweb components (Van den Akker, 2003). This combination of the two theoretical concepts was the backbone construct to develop ultimately the survey instrument. So, for this paper a survey instrument was needed that measured the readiness for innovation in the status quo and the potential for change (i.e., implementing CBL) in the ongoing curricula. Subsequently, for the purpose of measurement, with the help of literature review, experts knowledge and pre-tests the survey instrument (a closed-structured questionnaire) was developed throughout this paper. Furthermore, to achieve the goal of this paper the survey instrument was implemented to the case of the UTwente at the institutional level. So, this led to an overview, from the perspective of course and module coordinators, about the extent to which CBL components are currently already used and the potential of the courses and modules to implement CBL across all faculties of the UTwente in the future. Subsequently, the following main findings appeared. From the perspective of course and module coordinator, 1) in the current state, there is a 'slight to moderate' use of the CBL components. Moreover, the faculty of ITC and the 'master' study program is using more of the CBL components compared to other faculties across the UTwente. Also, the CBL component 'teacher role' is the most used one. 2) In the potential state, except for not having room and being open towards change of the 'teacher role', courses and modules have the potential to use CBL in the future, indicating 'moderate' readiness and openness towards change. The CBL component that requires the most attention is 'enterprise skills', the faculty 'EEMCS' and the study program 'bachelor', also courses/modules indicate the most potential for it to be implemented in the future. More work needs to be done to exploit the potential for implementing educational innovative practices such as CBL. But also courses and modules need to be restructured to be able to have more room and potential for change. Furthermore, also issues regarding the course and module coordinators attitude and openness towards change needs to be tackled (i.e., changing the teacher role).

In the following section insightful theoretical and practical implications of the findings in this paper will be explained. Nonetheless, these are subject to various limitations and can be useful indications for any future research.

6.1 Theoretical implications

First off, this paper adds to the already existing literature by giving an overview of the CBL concept by categorizing it into an overview of the following CBL components (flexible learning path, stakeholder involvement, teacher role, real-world experiences, interdisciplinary, co-designer, learning in learning communities). Furthermore, this concept of the CBL components was combined with a framework of curriculum improvement and renewal, the curriculum spiderweb by Van den Akker (2010). So, by combining these two concepts one has a framework of the innovative educational practice of CBL in an ongoing curriculum at a higher educational institution. Additionally, researchers and people from the field of interest of innovation in education, innovative educational practices and CBL, have a guidance with the theoretical framework of how the concept of innovative educational practices such as CBL can be integrated within an ongoing curriculum at higher educational institutions. So, while the curriculum spider web of Van den Akker (2010) can be used by researchers and curriculum innovators to describe the curriculum of higher educational institutions in a more simple and comprehensive way, the categories of the CBL components help to understand better what CBL explicitly is and could be helpful to apply it within an ongoing curriculum.

Moreover, this paper was an initial attempt to come up with a framework for CBL in an ongoing curriculum at a higher educational institution. Subsequently, a (survey) instrument was developed to measure innovation in higher educational institutions. This lays the foundation for measuring innovative educational practices such as CBL on an institutional level. So, researchers can gain valuable and profound insights by using this framework and (survey) instrument. In addition, researchers can use this framework and instrument to refine and improve it for future research.

In consequence by applying the (survey) instrument, this paper came up with valuable conclusions for the improvement of innovation in higher education which will be further explored in the next section.

6.2 Practical implications

First off in general, higher educational institutions and innovators of education in higher educational institutions can use the (survey) instrument to measure the extent of innovative educational practices, in this case CBL, currently in use and the potential for change across the curriculum of higher educational institutions. This supports them to measure innovativeness in general, to identify which programs and faculties are doing better, which ones have shortcomings and which ones have the highest potential for change. Subsequently, these issues can be addressed which probably leads to improvement in innovation in higher educational institutions. So, ultimately it serves the purpose of identification of shortcomings and improvement of innovation. Moreover, this (survey) instrument helps module coordinators and people who are responsible to improve innovation across the educational institution to measure innovative educational practices at the current and potential state.

For the case of the UTwente, the results of this paper emphasize the importance of measuring the difference between the current use of innovative educational practices and the potential for change. So, the difference between the current and potential state. By measuring this, course and module coordinators or people in charge to innovate (restructure) the curriculum can assess how much room there is for improvement including readiness towards the use of e.g., CBL. The results show that there is a difference between the current and potential state. So, while there is a current ‘slight to moderate’ use of CBL components across the courses and modules, there is ‘moderate’ readiness to exploit the potential for change. The full potential has not been exploited in the current state. This means that there is room for improvement and the higher educational institutions need to grasp this potential. This requires reconsidering the structure and content of the courses and modules already in use, including the curriculum. However, due to having in general ‘moderate’ room for change, course and module coordinators or people in charge need to consider how to restructure the curricula to have more potential and room for change across the courses and modules throughout the UTwente.

Furthermore, the results show that the ‘ITC’ faculty and the ‘master’ courses/modules are using currently more innovative educational practices such as CBL. These could serve as an example for improving other faculties and courses/modules. So, course and module coordinators or other people in charge could look at how these examples have structured and integrated innovative educational practices such as CBL into their curriculum.

Next, it has been shown that the faculty of ‘EEMCS’ and the ‘bachelor’ study program are the least innovative ones regarding using the CBL components. Nonetheless, these also indicate and have the most potential for change in the future. So, course and module coordinators need to tackle these weak links and work towards improving the curricula especially by exploiting their potential for change.

Another issue is the openness towards change regarding the CBL components. So, while course and module coordinators see more potential and are more open towards changing and improving the CBL component ‘enterprise skills’, they are more reluctant towards changing or improving the ‘teacher role’. Subsequently, course and module coordinators could, next to considering working on the ‘enterprise skills’, reconsider the ‘teacher role’. Because this has an influence on how open course and module coordinators are and their attitude towards change.

6.3 Future Research and Research limitations

This paper laid the foundation for a survey instrument to measure innovative educational practices such as CBL at higher educational institutions and to assess the potential for change. So, future research can use this instrument as a backbone construct to measure innovativeness (i.e., CBL) at other higher educational institutions across the Netherlands, Europe or worldwide. Subsequently, this can also serve the purpose of comparison across various higher educational institutions and ultimately to learn from each other on how to apply educational innovative practices much better into the curriculum.

Furthermore, this paper can be used as a starting point which requires extension. So, with the results of the survey from this paper future research could undertake follow up interviews with course and module coordinators for a more in-depth understanding, discussion, and new insights. This can not only lead to better understand the outcome of this paper, but also to assess course and modules coordinators attitude towards change. Moreover, future research can arrange panels and discussion groups to gain new valuable insights on innovative educational practices and their potential or to discuss the outcomes of this paper. Future research can also look at innovativeness across the courses and modules from the perspective of students and initiate surveys for students. Also, observation studies such as visiting the courses and modules can lead to further research outcomes. All in all, the beforementioned can be used for improvement of innovation and use of innovative educational practices across higher educational institutions. Additionally, the datasheet and outcome of this paper is large and allows future research to investigate the data more in depth and come up with further outcomes and conclusion. So, it allows to come up with more hypothesises regarding the use of CBL components and their potential. Another starting point for future research could be to refine or restructure the survey instrument further. By for instance looking at other innovative educational practices, include other CBL components or assessing the attitude of module and course coordinators more in-depth could unravel some interesting insights. This in turn could be interesting to assess whether there is openness towards change.

Although this paper delivers outcomes with valuable insights it is also subject to some research limitations. First off, the theoretical framework in this paper which used the concept of the curriculum spiderweb may not fit every higher educational institution's structure and may not be applicable. So, in general it is not a one size fits all framework and future research may consider other concepts. Furthermore, the outcomes of this paper are to some extent subject to validity and reliability issues because data was only collected during a certain period once. A repetition of this study (survey) over a longer period or different time periods, but also increasing the expected response rate is required to confirm how well the survey measures and to confirm the outcomes. This ultimately helps to overcome validity and reliability issues. Another issue is that the outcomes of this study are only limited to the perspective of course and module coordinators. So, it is restricted to only one perspective. By looking at other perspectives such as the student's perspective, undertaking observation studies during courses, having panels or discussion groups can potentially overcome this issue. A further issue is that this survey instrument does not include all CBL components available which was due to pre-testing and including experts to make the survey more feasible to execute. Further research could investigate measuring also other CBL components more in-depth.

7. References

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8. Appendix

8.1 Appendix A: List of relevant Literature

List of relevant Literature (empirical research on Challenge based learning) and innovation in education:

Thurlings et al. (2015)	Toward a Model of Explaining Teachers' Innovative Behavior: A Literature Review
Könings et al. (2006)	Teachers' perspectives on innovations: Implications for educational design
Pearson (2019)	The Global Learner Survey
Park and Ertmer (2007)	Impact of Problem-Based Learning (PBL) on Teachers' Beliefs Regarding Technology Use
Bouckenooghe et al. (2009)	Organizational Change Questionnaire–Climate of Change, Processes, and Readiness: Development of a New Instrument
Benneworth et al. (2017)	Measuring the contribution of higher education to innovation capacity. Final report for the European Commission
Rådberg et al. (2018)	Measuring the contribution of higher education to innovation capacity. Final report for the European Commission
Tecnologico de Monterrey and Observatory of Educational Innovation (2015)	EDUTrends: Challenge Based Learning
Levey (2009)	Diffusion of Inclusion: Measuring Willingness
Messmann and Mulder (2012)	Development of a measurement instrument for innovative work behaviour as a dynamic and context-bound construct
Trigwell and Prosser (2004)	Development and Use of the Approaches to Teaching Inventory
Cordray et al. (2009)	A Research Synthesis of the Effectiveness, Replicability, and Generality of the VaNTH Challenge-based Instructional Modules in Bioengineering
Binder at al. (2017)	Challenge Based Learning Applied to Mobile Software Development Teaching
Apple Inc. (2011)	Challenge Based Learning A Classroom Guide
Van den Akker (2010)	Building bridges: how research may improve curriculum policies and classroom practices
Rådberg et al. (2018)	From CDIO to challenge-based learning experiences – expanding student learning as well as societal impact?
Gallagher & Savage (2020)	Challenge-based learning in higher education: an

	exploratory literature review
Nichols et al. (2016)	CBL Guide
Roselli and Brophy (2013)	Effectiveness of Challenge-Based Instruction in Biomechanic
Barr et al. (2007)	Challenge-Based Instruction: The VaNTH Biomechanics Learning Modules
O'Mahony et al. (2012)	A Comparison of Lecture-Based and Challenge-Based Learning in a Workplace Setting: Course Designs, Patterns of Interactivity, and Learning Outcomes
Johnson & Brown (2011)	Challenge Based Learning The Report from the Implementation Project
Magnell and Högfeldt (2014)	Guide to challenge driven education ECE Teaching and Learning in Higher Education no 1
Andersson (2014)	DEMOLA EAST SWEDEN: THE INNOVATION INTERMEDIARY A study of the innovation project process and the user experience of Demola East Sweden
Linköping, Chiriac et al. (2008)	A scheme for understanding group processes in problem-based learning
Melin et al. (2008)	Project-based Learning - An Emergent Framework for Designing Courses
Borgsjö (2013)	Trends in Innovative Education
Klaassen (2018)	Interdisciplinary education: a case study
Jensenius (2012)	Disciplinarities: Intra, Cross, Multi, Inter, Trans.
Nichols and Cator (2008)	Challenge Based Learning Take action and make a difference
Johnson et al. (2009)	Challenge-Based Learning An Approach for Our Time
Martin et al. (2007)	Comparison of Student Learning in Challenge-based and Traditional Instruction in Biomedical Engineering
Angelle (2018)	Project-based and Problem-based Instruction: A Literature Review
Gaskins et al. (2015)	Changing the Learning Environment in the College of Engineering and Applied Science Using Challenge Based Learning
Malmqvist et al. (2015)	COMPARATIVE ANALYSIS OF CHALLENGE-BASED LEARNING EXPERIENCES

8.2 Appendix B: Figures of theoretical models:

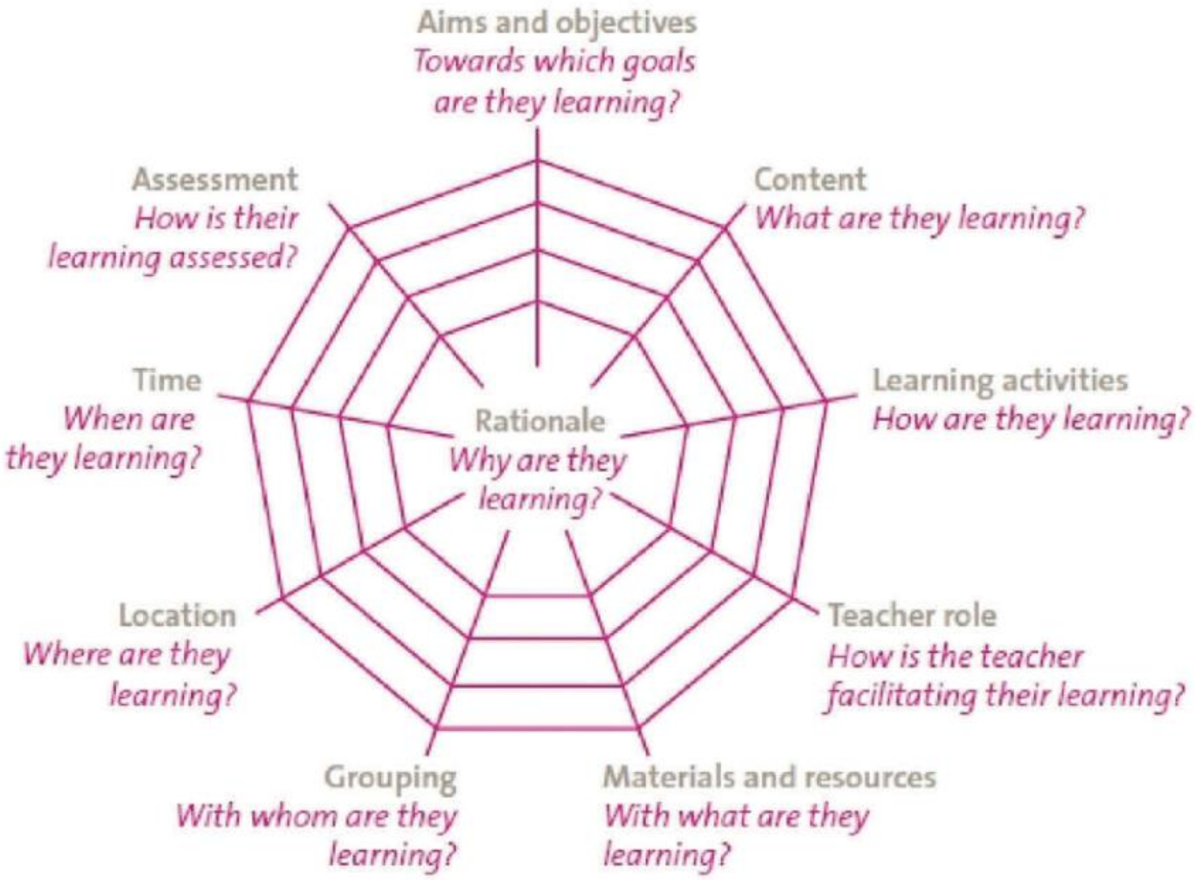


Figure 1: The curricula spider web (Thijs and Van den Akker, 2009, p.59).

https://www.researchgate.net/publication/327885035_Paderborn_Symposium_on_Data_Science_Education_at_School_Level_2017_The_Collected_Extended_Abstracts/figures

Rationale	Why are they learning?
Aims & objectves	Toward which goals are they learning?
Content	What are they learning?
Learning activities	How are they learning?
Teacher role	How is the teacher facilitating their learning?
Materials & resources	With what are they learning?
Grouping	With whom are they learning?
Location	Where are they learning?
Time	When are they learning?
Assessment	How to assess their learning progress?

Box 2. Curriculum components

Figure 2: The challenge based learning framework (Nichols et al., 2016)

https://cbl.digitalpromise.org/wp-content/uploads/sites/7/2016/10/CBL_Guide2016.pdf

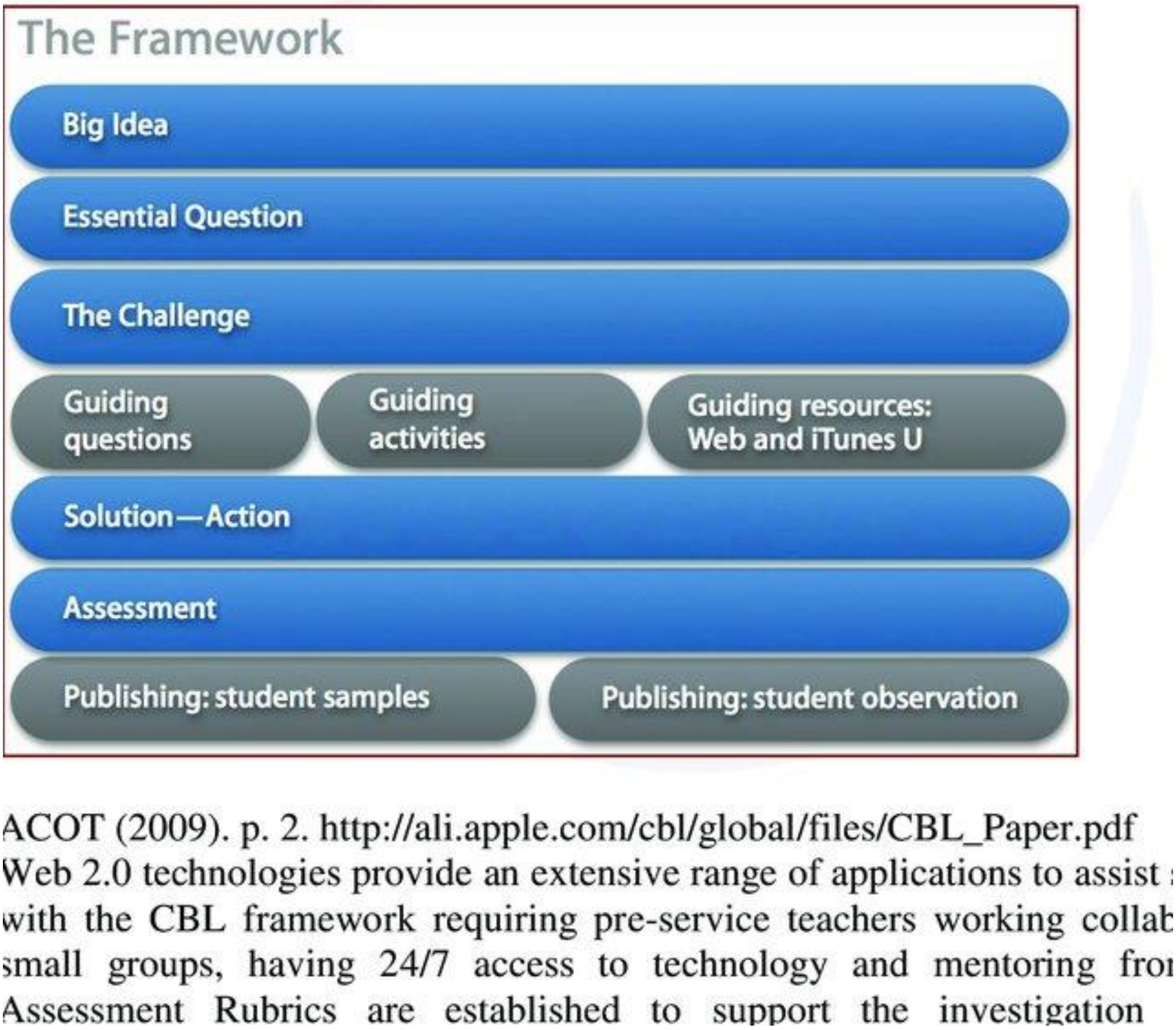


Figure 3: The CBL framework (ACOT, 2009)

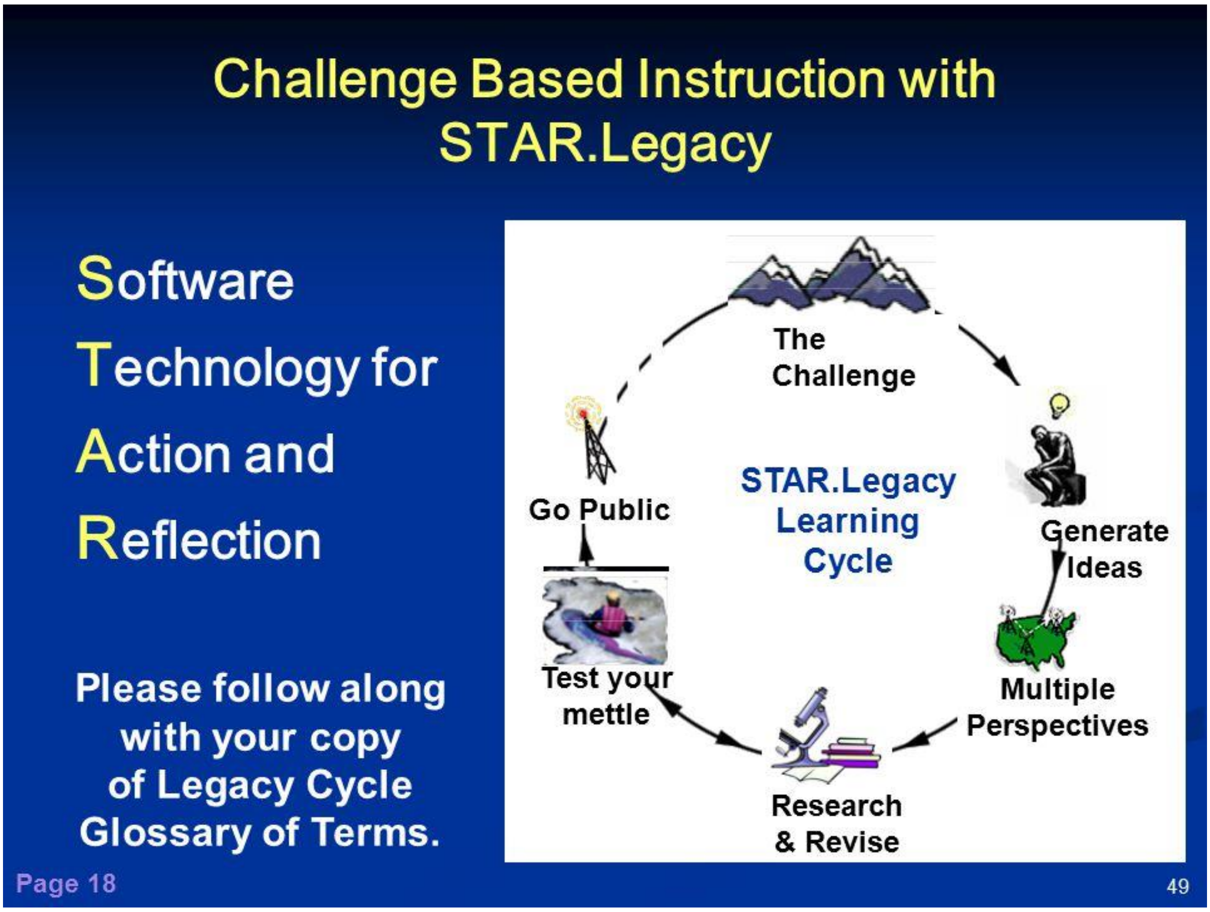


Figure 4: STAR Legacy Learning Cycle: Software Technology for Action and Reflection (Brophy et al., 2001)

TABLE I. COMPARISON BETWEEN CBL X OTHER ACTIVE METHODS

Flipped Classroom

Features/Methods	CBL	PBL	PjBL	FC
Previous Study				x
Predefined content		x	x	x
Predefined Challenge		x	x	x
Self paced learning	x	x	x	x
Collaborative Learning	x	x	x	x
Autonomy	x	x	x	x
Critical Thinking	x	x	x	x
Problem Solving	x	x	x	x
Student Feedback	x	x	x	x
Evaluation Review	x	x	x	x
Challenges defined by students and teachers	x			
Specific Environment	x			
Solution implementation	x			
Frequent self reflection	x			

Binder et al., 2017
https://www.researchgate.net/profile/Fabio_Binder/publication/321662439_Challenge_Based_Learning_Applied_to_Mobile_Software_Development_Teaching/links/5b9a4a18458515310584d2ff/Challenge-Based-Learning-Applied-to-Mobile-Software-Development-Teaching.pdf?origin=publication_detail

Figure 5: Comparison between CBL and other active methods (Binder et al., 2017)

Technique/ characteristic	Project Based Learning	Problem Based Learning	Challenge Based Learning
Learning	Students build their knowledge through a specific task (Swiden, 2013). The knowledge acquired is applied to carry out the assigned project.	Students acquire new information through self-directed learning using designed problems (Boud, 1985, in Savin-Baden and Howell Major, 2004). The knowledge acquired is applied to solve the problem at hand.	Students work with teachers and experts in their communities, on real-world problems, in order to develop a deeper knowledge of the subjects they are studying. It is the challenge itself that triggers the generation of new knowledge and the necessary tools or resources.
Focus	It faces the students with a relevant situation and predefined problematic, for which a solution is required (Vicerrectoría de Normatividad Académica y Asuntos Estudiantiles, 2014).	It faces students with a relevant problematic situation, often fictional, for which a real solution is not needed (Larmer, 2015).	It faces students with an open, relevant, problematic situation, which requires a real solution.
Product	It requires the students to generate a product, a presentation or an implementation of the solution (Larmer, 2015).	It focuses more on the learning processes than the products of the solutions (Vicerrectoria de Normatividad Académica y Asuntos Estudiantiles, 2014).	It requires students to create a solution resulting in a concrete action.
Process	Students work with the assigned project so their engagement generates products for their learning (Moursund, 1999).	Students work with the problem in a way that tests their ability to reason and apply their knowledge to be evaluated according to their learning level (Barrows and Tamblyn, 1980).	Students analyze, design, develop and execute the best solution in order to tackle the challenge in a way they and other people see and measure.
Teacher's role	Facilitator and project manager (Jackson, 2012).	Facilitator, guide, tutor or professional adviser (Barrows, 2001 cited in Ribeiro and Mizukami, 2005).	Coach, co-researcher and designer (Baloian, Hoeksema, Hoppe and Milrad, 2006).

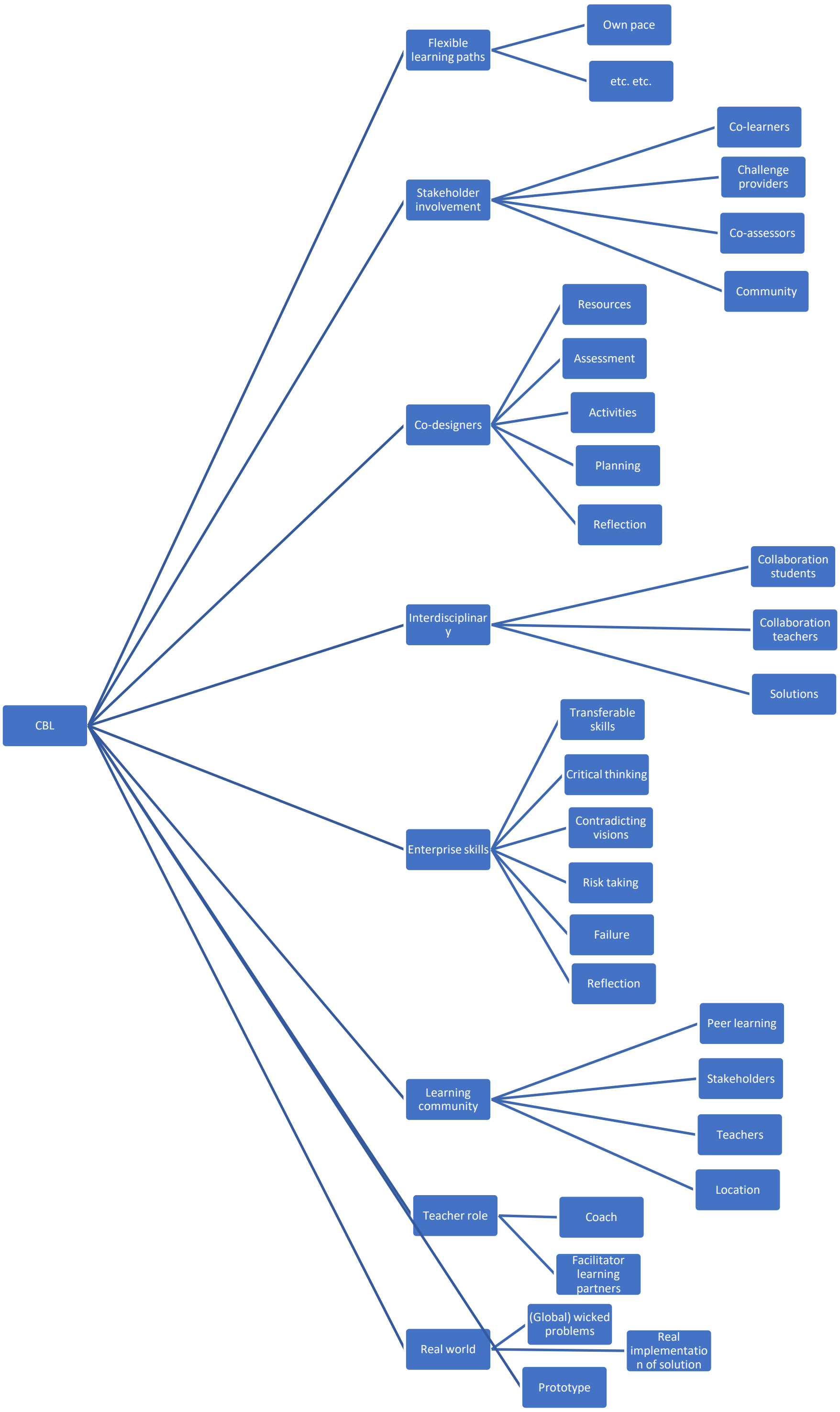


Figure 7: Operationalisation of the Theoretical framework

8.3. Appendix C: Online survey and Introduction letter via email

Dear course coordinators/course co-designers,

The UTwente is very much committed to leverage its academic and societal impact through innovative educational practices, adopting new learning strategies and involving third party/stakeholders to better match and align the needs of students and society. The ambition to adopt suitable and novel educational frameworks is formulated in the UT's mission and vision report "Shaping 2030" as well as in the running ECIU-U project.

Recently, one of our master students in Business Administration, Sahar Afzali, started a research project with the aim to gain detailed insights in the current state and potential for innovation of education based on third party/stakeholder involvement in the courses offered by the UT. The insights are considered important because it provides valuable information for defining suitable and responsible actions to bring our ambition to life, albeit in a pedagogical responsible manner. Therefore, I really appreciate your contribution to this research by filling in the survey.

The survey consists of statements aimed to measure the extent the item/feature is present in your course/module and to what extent the subject of the statement has the potential to develop. It takes about 15-20 minutes to complete and try to do so based on your best knowledge about the course or module that you are going to rate. You can finish the survey only once but it is possible to change your answers while the survey is open.

To start the survey click on the link below:

https://utwentebs.eu.qualtrics.com/jfe/form/SV_43dOzubz0iHI5OR

Sahar's research project is supervised by Leonie Bosch Chapel, MSc (CES/CELT) and dr. Raymond Loohuis (BMS/NIKOS) and is carried out based on the BMS framework of the ethical principles for which your consent is explicitly requested.

If you have questions regarding the survey, please send us an email: s.afzali@student.utwente.nl or to one of the supervisors.

Thanks in advance for participating

Yours sincerely,

Drs. ing. Frits Oukes MSc. | ***Interim Afdelingshoofd Centre of Expertise in Learning and Teaching (CELT)***

Please use the following link to start with the survey: https://utwentebs.eu.qualtrics.com/jfe/form/SV_43dOzubz0iHI5OR

Didactic approaches and practices at the University of Twente

Welcome to the didactic approaches and practices research study!

Among other things, we are interested in understanding the degree and potential of didactic approaches and practices and third party/ stakeholder involvement in your course or module. You can help us with this study because you are the ones owning the information and having on hand experience.

For this study, you will be asked to answer questions relevant to this quest.

The survey should take you around 15-20 minutes to complete.

Q1

Consent Form for didactic approaches and practices at the University of Twente

YOU WILL BE GIVEN A COPY OF THIS INFORMED CONSENT FORM IF REQUESTED

Please tick the appropriate boxes

Taking part in the study

	Yes	No
I have read and understood the background of this research as stated in the introduction of the mail sent with the survey and I was able to ask questions about this research in case I had any.	○	○
I consent voluntarily to be a participant in this research and understand that I can refuse to answer questions and I can withdraw from this research at any time, without having to give a reason.	○	○
I understand that taking part in the research involves a survey questionnaire	○	○

	Yes	No
completed by me as a participant.		

Q2

Use of the information in the study

	Yes	No
I understand that information I will provide will be used for a report of a master thesis.	○	○
I understand that personal information collected about me that can identify me, such as my name will not be shared beyond the research study team.	○	○
I agree that my responses can be quoted in research outputs anonymously.	○	○

Q3

Future use and reuse of the information by others

	Yes	No
I give permission for the survey database which is anonymized, that I provide survey data	○	○

	Yes	No
to be archived in UTwente repository so it can be used for future research and learning.		

Q4

Study contact details for further information: Afzali Sahar, s.afzali@student.utwente.nl

Contact Information for Questions about Your Rights as a Research Participant

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee of the Faculty of Behavioural, Management and Social Sciences at the UTwente by ethicscommittee-bms@utwente.nl

Q5

By clicking below you agree to the informed consent form provided above

- ○ I consent, begin the survey
- ○ I do not consent, I do not wish to participate

Q6

Background information

What is your gender?

- ○ Female
- ○ Male

Q7

How many years of experience do you have in teaching in higher education?

[ ]

Q8

Please fill in specifically one course/module code you are assessing for the purpose of this research and indicate whether it is a course or module (course/module should have taken place before the corona pandemic).

- ○ Course code [ ]
- ○ Module code [ ]

Q9

Indicate your latest involvement in the course/module that you are going to rate for this survey

- 2019-2020
- 2018-2019
- 2017-2018
- Older

Q10

Indicate in which study program this course/module is positioned

- Bachelor
- Master
- Pre-Master
- Minor

Q11

Indicate in which study year that course/module is held in the program

- 1st year
- 2nd year
- 3rd year

Q12

Did you (co-) design that course/module?

- Yes
- No
- Other

Q13

Please indicate the teaching methods used for that course/module (multiple answers are possible)

- Lecture
- Flipped classroom
- Workshop/seminars
- Peer-to-peer/review sessions
- Tutorials
- Simulation/game-based

- ☐ Field work
- ☐ Project
- ☐ Other

Q14

Please indicate which assessment methods are used for that course/module (multiple answers are possible)

- ☐ Written exam (multiple choice/open-ended questions)
- ☐ Advisory report
- ☐ Research paper
- ☐ New product
- ☐ Proposal
- ☐ Essay
- ☐ (Pitch) presentation
- ☐ Other

Q15

In this survey you will be asked to rate statements to your best knowledge. In the first section, you will be asked to rate the current state of your course/module. In the second, you will be asked to judge the potential for change.

Q16

In this course/module, students work in groups

- ○ Yes
- ○ No

Q17

What is the amount of group learning activities in your course/module in % time compared to individual learning activities?

- ○ 0-20
- ○ 20-40
- ○ 40-60
- ○ 60-80
- ○ 80-100

Q18

Current

Please rate to what extent each statement applies to the course/module as indicated by you

	Not at all	Slightly	Moderately	Considerably	To the full extent
We specifically assess transferable skills not specific to the domain, such as critical thinking, collaboration, communication	○	○	○	○	○
Students demonstrate their intermediate results to a wider audience (i.e. stakeholders, community etc.), for instance to collect feedback for improvement	○	○	○	○	○
Students solve actual complex/wicked problems provided by the real-world	○	○	○	○	○

Q19

	Not at all	Slightly	Moderately	Considerably	To the full extent
We assess student achievements throughout the learning process rather than the end-result only	○	○	○	○	○
Students can determine the pace of their own learning process. This includes the moment that they want to be assessed (for instance to submit their paper)	○	○	○	○	○
Students themselves document their entire learning process for assessment purposes	○	○	○	○	○

	Not at all	Slightly	Moderately	Considerably	To the full extent
Students have a say on how they will be assessed	◌	◌	◌	◌	◌
External stakeholder are co-assessors (regardless if this involves summative or formative assessment)	◌	◌	◌	◌	◌

Q20

	Not at all	Slightly	Moderately	Considerably	To the full extent
The content is adjusted to the individual areas of interest of students	◌	◌	◌	◌	◌
The content is acquired through peer learning	◌	◌	◌	◌	◌

Q21

	Not at all	Slightly	Moderately	Considerably	To the full extent
Student group formation is based on their own specific qualities such as skills, personal traits, background knowledge, interests, etc.	◌	◌	◌	◌	◌
Students work in multidisciplinary teams of students with different educational backgrounds	◌	◌	◌	◌	◌
Students are part of a learning community (e.g. with industry representatives, professors etc.)	◌	◌	◌	◌	◌

Q22

	Not at all	Slightly	Moderately	Considerably	To the full extent
External stakeholders are actively engaged in	◌	◌	◌	◌	◌

	Not at all	Slightly	Moderately	Considerably	To the full extent
critical parts of the learning process/activity					
Students develop knowledge and skills through experience (i.e. real world learning experience such as working with industry experts, presenting results to them etc.)	○	○	○	○	○
As part of the feedback sessions, students are asked to raise critical questions	○	○	○	○	○
A substantial part of the learning activities are dedicated to students reflecting on the learning process	○	○	○	○	○

Q23

	Not at all	Slightly	Moderately	Considerably	To the full extent
We have reserved an additional workspace for students to use freely whenever they need it	○	○	○	○	○
Students can explore a location outside the University that is central to the subject matter	○	○	○	○	○

Q24

	Not at all	Slightly	Moderately	Considerably	To the full extent
Students use the latest technology and methods within their field of study	○	○	○	○	○

	Not at all	Slightly	Moderately	Considerably	To the full extent
Students choose the key learning materials themselves					
Students are part of the research community					
Students build a prototype/solution					
Students test the prototype/solution under real life conditions, evaluate and optimize it					

Q25

	Not at all	Slightly	Moderately	Considerably	To the full extent
Students discuss ongoing contradicting viewpoints lingering within and outside the course discipline					
Students develop their own learning outcomes/goals in line with the existing Program-level Intended Learning Outcomes (PILO's)					
The solution/conclusion reflects the ethical considerations of the stakeholders affected by the solution					
We do not intervene if students make mistakes in critical parts during their learning process					
Students take risk and experiment to critically					

	Not at all	Slightly	Moderately	Considerably	To the full extent
explore and assess the boundaries of their learning object					

Q26

	Not at all	Slightly	Moderately	Considerably	To the full extent
The educator act as a coach during the learning process rather than being a lecturer	○	○	○	○	○
Educators are considered senior partners in the learning process	○	○	○	○	○
This course/module is continuously updated with the latest innovative didactic methods	○	○	○	○	○
The educator provides students with a variety of learning partners within as well as outside the campus	○	○	○	○	○

Q27

	Not at all	Slightly	Moderately	Considerably	To the full extent
We deviate from the planning when students are interested in lateral aspects of the course content, even if that means not everything that was planned can be done	○	○	○	○	○
We adjust the pace of the learning activities whenever necessary, allowing students to process what they have learned	○	○	○	○	○

	Not at all	Slightly	Moderately	Considerably	To the full extent
We offer time to let students (re-) consider different perspectives to craft thoughtful solutions	◌	◌	◌	◌	◌

Q28

Potential

Please consider the following scenario. While respecting the Programme Intended Learning Outcomes (PILOS), think about the course/module you just have rated and try to consider if there would be room for change for each statement you have just rated, for the next (academic) year.

Q29

	Definitely not	Probably not	Possibly	Probably	Definitely
We could specifically assess transferable skills not specific to the domain, such as critical thinking, collaboration, communication	◌	◌	◌	◌	◌
Students could demonstrate their intermediate results to a wider audience (i.e. stakeholders,community etc.), for instance to collect feedback for improvement	◌	◌	◌	◌	◌
Students could solve actual complex/wicked problems provided by the real-world	◌	◌	◌	◌	◌

Q30

	Definitely not	Probably not	Possibly	Probably yes	Definitely
We could assess student achievements throughout the learning process rather than the end-result only	◌	◌	◌	◌	◌

	Definitely not	Probably not	Possibly	Probably yes	Definitely
Students could have the freedom to determine the pace of their own learning process. This includes the moment that they want to be assessed (for instance to submit their paper)	○	○	○	○	○
We could let students themselves document their entire learning process for assessment purposes	○	○	○	○	○
Students could have a say on how they will be assessed	○	○	○	○	○
External stakeholders could be co-assessors (regardless if this involves summative or formative assessment)	○	○	○	○	○

Q31

	Definitely not	Probably not	Possibly	Probably	Definitely
The content could be adjusted to the individual areas of interest of students	○	○	○	○	○
The content could be acquired through peer learning	○	○	○	○	○

Q32

	Definitely not	Probably not	Possibly	Probably	Definitely
We could let students form groups based on their own specific qualities such as skills, personal traits, background knowledge, interests, etc.	○	○	○	○	○

	Definitely not	Probably not	Possibly	Probably	Definitely
Students could work in multidisciplinary teams of students with different educational backgrounds					
Students could be part of a learning community (e.g. with industry representatives, professors etc.)					

Q33

	Definitely not	Probably not	Possibly	Probably	Definitely
External stakeholders could be actively engaged in multiple parts of the learning process/activity					
Students could develop knowledge and skills through experience (i.e. real world learning experience such as working with industry experts, presenting results to them etc.)					
As part of the student feedback sessions, students could be asked to raise critical questions.					
A substantial part of the learning activities could be dedicated to students reflecting on the learning process					

Q34

	Definitely not	Probably not	Possibly	Probably	Definitely
We could reserve an additional workspace					

	Definitely not	Probably not	Possibly	Probably	Definitely
for students to use freely whenever they need it					
Students could have the opportunity to explore a location outside the university that is central to the subject matter	○	○	○	○	○

Q35

	Definitely not	Probably not	Possibly	Probably	Definitely
Students could use the latest technology and methods within their field of study	○	○	○	○	○
Students could choose the key learning materials themselves	○	○	○	○	○
Students could be part of the research community	○	○	○	○	○
Students could build a prototype/solution	○	○	○	○	○
Students could test the prototype/solution under real life conditions, evaluate and optimize it	○	○	○	○	○

Q36

	Definitely not	Probably not	Possibly	Probably	Definitely
Students could discuss ongoing contradicting viewpoints lingering within and outside the course discipline	○	○	○	○	○

	Definitely not	Probably not	Possibly	Probably	Definitely
Students could develop their own learning goals in line with the existing Program-level Intended Learning Outcomes (PILO's)	○	○	○	○	○
The solution/conclusion could reflect the ethical considerations of the stakeholders affected by the solution	○	○	○	○	○
We could let students make mistakes in critical parts during their learning process	○	○	○	○	○
Students could take risk and experiment to critically explore and assess the boundaries of their learning object	○	○	○	○	○

Q37

	Definitely not	Probably not	Possibly	Probably	Definitely
The educator could act as a coach during the learning process rather than being a lecturer	○	○	○	○	○
Educators could be senior partners in the learning process	○	○	○	○	○
We could adjust this course/module continuously to the latest innovative didactic methods	○	○	○	○	○
The educator could provide students with a variety of learning partners within as well as outside the campus on a regular basis	○	○	○	○	○

Q38

	Definitely not	Probably not	Possibly	Probably	Definitely
We could deviate from the planning when it appears students are interested in lateral aspects of the course content, even if that means not everything that was planned can be done	○	○	○	○	○
We could adjust the pace of the learning activities when necessary, allowing students to process what they have learned	○	○	○	○	○
We could offer time to let students (re-) consider different perspectives to craft thoughtful solutions	○	○	○	○	○

Thank you for your time to participate in this survey!

Please let us know if you have any additional remarks/comments regarding the survey

8.4. Appendix D: List of Test of Association

Current state:

Years of experience	One way Anova	C_ST3 *same with the Zscore	Reject null hypothesis (There is a difference	Spearman rho correlation coefficient=-0.330 p=0.005, significant weak negative correlation, there is probably a difference Chi square=16.97 p=0.03
18. Years of experience	One way Anova	C_FLP4 *same with the Zscore	Reject null hypothesis (There is a difference	Spearman rho correlation coefficient=-0.323 p=0.006, significant weak negative correlation, there is probably a difference Chi square=16 p=0.042
Years of experience	One way Anova	C_ST4 *same with the Zscore	Reject null hypothesis (There is a difference	Spearman rho correlation coefficient=-0.327 p=0.011, significant weak to moderate negative correlation, there is probably a difference Chi square=17.051 p=0.030
Years of experience	One way Anova	C_ST6 *same with the Zscore	Reject null hypothesis (There is a difference	Spearman rho correlation coefficient=-0.398 p=0.001, significant weak to moderate negative correlation, there is probably a difference Chi square=16.951 p=0.031

Years of experience	One way Anova	C_ES3 *same with the Zscore	Reject null hypothesis (There is a difference	Spearman rho correlation coefficient=-0.392 p=0.001, significant weak to moderate negative correlation, there is probably a difference Chi square=15.691 p=0.047
Years of experience	One way Anova	C_TR7 *same with the Zscore	Reject null hypothesis (There is a difference	Spearman rho correlation coefficient=-0.297 p=0.011, significant weak negative correlation, there is probably a difference Chi square=9.424 p=0.308
Years of experience	One way Anova	C_TR4 *same with the Zscore	Reject null hypothesis (There is a difference	Spearman rho correlation coefficient=-0.351 p=0.003, significant weak to moderate negative correlation, there is probably a difference Chi square=14.207 p=0.077
Years of experience	One way Anova	C_FLP10 *same with the Zscore	Reject null hypothesis (There is a difference	Spearman rho correlation coefficient=-0.333 p=0.004, significant weak to moderate negative correlation, there is probably a difference Chi square=14.464 p=0.07

Years of experience	One way Anova	C_ST7 *same with the Zscore	Reject null hypothesis (There is a difference	Spearman rho correlation coefficient=-0.355 p=0.002, significant weak to moderate negative correlation, there is probably a difference Chi square=11.469 p=0.177

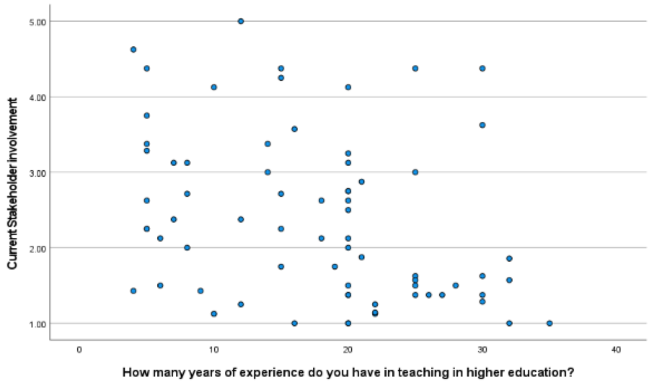
Potential state:

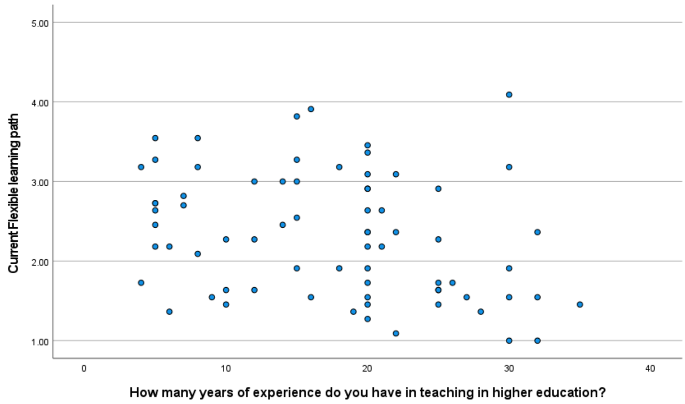
Years of experience	One way Anova	P_FLP10	Reject null hypothesis (There is a difference	Spearman rho correlation coefficient=-0.289 p=0.017, significant weak negative correlation, there is probably a difference Chi square=15.379 p=0.052
Years of experience	One way Anova	P_ES2 *same with the Zscore	Reject null hypothesis (There is a difference	Spearman rho correlation coefficient=-0.162 p=0.174, Not significant weak negative correlation, there is probably a difference Chi square=13.73 p=0.186
Years of experience	One way Anova	P_FLP6 *same with the Zscore	Reject null hypothesis (There is a difference	Spearman rho correlation coefficient=-0.392 p=0.001, significant weak to moderate negative correlation, there is probably a difference

				Chi square=18.930 p=0.015
Years of experience	One way Anova	P_RW2 *same with the Zscore	Reject null hypothesis (There is a difference	Spearman rho correlation coefficient=-0.298 p=0.011, significant weak negative correlation, there is probably a difference Chi square=7.987 p=0.435
Years of experience	One way Anova	P_ST5 *same with the Zscore	Reject null hypothesis (There is a difference,	Spearman rho correlation coefficient=-0.220 p=0.063, Not significant weak negative correlation, there is probably a difference Chi square=11.661 p=0.167

8.5 Appendix E: SPSS outputs

8.5.1 Scatterplots 'years of experience' against each 'CBL component'





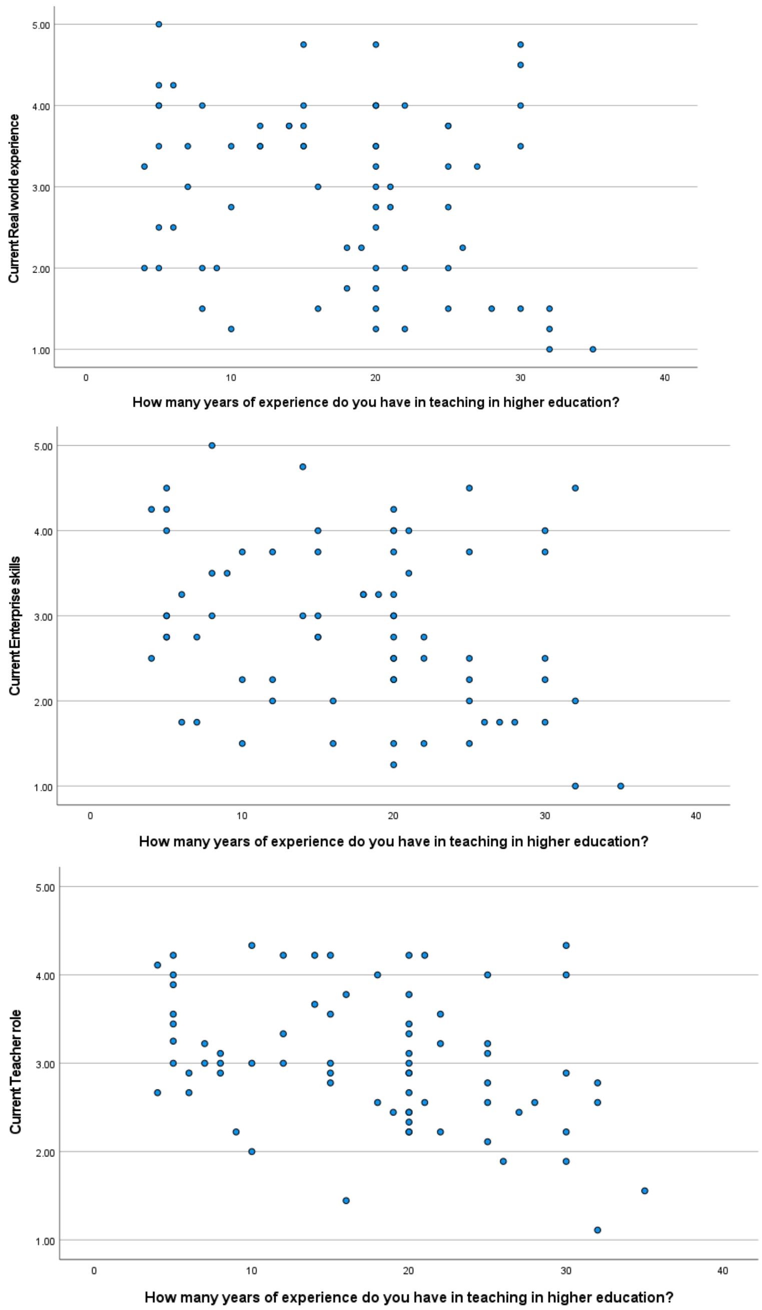


Figure 8: Scatterplots of years of teaching experience against each CBL component ‘stakeholder involvement’, ‘flexible learning path’, ‘real world experience’, ‘enterprise skills’ and ‘teacher role’.

8.5.2. Nonparametric test of association: Years of experience vs CBL components in the current and potential state

```
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```

Nonparametric Correlations

Correlations

			CEX	C_ST3 Students demonstrate their intermediate results to a wider audience (i.e. stakeholders, community etc.), for instance to collect feedback for improvement
Spearman's rho	CEX	Correlation Coefficient	1.000	-.330**
		Sig. (2-tailed)	.	.005
		N	72	72
	C_ST3 Students demonstrate their intermediate results to a wider audience (i.e. stakeholders, community etc.), for instance to collect feedback for improvement	Correlation Coefficient	-.330**	1.000
		Sig. (2-tailed)	.005	.
		N	72	72

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

CROSSTABS

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/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
C_ST3 Students demonstrate their intermediate results to a wider audience (i.e. stakeholders, community etc.), for instance to collect feedback for improvement * CEX	72	100.0%	0	0.0%	72	100.0%

C_ST3 Students demonstrate their intermediate results to a wider audience (i.e. stakeholders, community etc.), for instance to collect feedback for improvement * CEX Crosstabulation

Count

		CEX			
		Low	Medium	High	Total
C_ST3 Students demonstrate their intermediate results to a wider audience (i.e. stakeholders, community etc.), for instance to collect feedback for improvement	Not at all	1	6	15	22
	Slightly	1	2	14	17
	Moderately	0	3	3	6
	Considerably	5	4	7	16
	To the full extent	2	6	3	11
Total		9	21	42	72

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.974[a]	8	.030
Likelihood Ratio	17.028	8	.030
Linear-by-Linear Association	8.788	1	.003
N of Valid Cases	72		

a. 10 cells (66.7%) have expected count less than 5. The minimum expected count is .75.

```
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```

Nonparametric Correlations

Correlations

			CEX	C_FLP4 Students themselves document their entire learning process for assessment purposes
Spearman's rho	CEX	Correlation Coefficient	1.000	-.323**
		Sig. (2-tailed)	.	.006
		N	72	72
	C_FLP4 Students themselves document their entire learning process for assessment purposes	Correlation Coefficient	-.323**	1.000
		Sig. (2-tailed)	.006	.
		N	72	72

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

```
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  /CELLS=COUNT
  /COUNT ROUND CELL.
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Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
C_FLP4 Students themselves document their entire learning process for assessment purposes * CEX	72	100.0%	0	0.0%	72	100.0%

C_FLP4 Students themselves document their entire learning process for assessment purposes * CEX Crosstabulation

Count

		CEX			Total
		Low	Medium	High	
C_FLP4 Students themselves document their entire learning process for assessment purposes	Not at all	2	6	24	32
	Slightly	0	5	5	10
	Moderately	3	5	5	13
	Considerably	1	1	6	8

	To the full extent	3	4	2	9
Total		9	21	42	72

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.000[a]	8	.042
Likelihood Ratio	16.832	8	.032
Linear-by-Linear Association	7.600	1	.006
N of Valid Cases	72		

a. 10 cells (66.7%) have expected count less than 5. The minimum expected count is 1.00.

```
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```

Nonparametric Correlations

Correlations

			CEX	C_ST4 Students are part of a learning community (e.g. with industry representatives, professors etc.)
Spearman's rho	CEX	Correlation Coefficient	1.000	-.327*
		Sig. (2-tailed)	.	.011
		N	72	59
	C_ST4 Students are part of a learning community (e.g. with industry representatives, professors etc.)	Correlation Coefficient	-.327*	1.000
		Sig. (2-tailed)	.011	.
		N	59	59

*. Correlation is significant at the 0.05 level (2-tailed).

```
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```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
C_ST4 Students are part of a learning community (e.g. with industry representatives, professors etc.) * CEX	59	81.9%	13	18.1%	72	100.0%

C_ST4 Students are part of a learning community (e.g. with industry representatives, professors etc.) * CEX Crosstabulation

Count

		CEX			Total
		Low	Medium	High	
C_ST4 Students are part of a learning community (e.g. with industry representatives, professors etc.)	Not at all	1	4	19	24
	Slightly	2	8	4	14
	Moderately	1	1	7	9
	Considerably	2	3	4	9
	To the full extent	1	2	0	3
Total		7	18	34	59

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	17.051[a]	8	.030
Likelihood Ratio	18.512	8	.018
Linear-by-Linear Association	5.886	1	.015
N of Valid Cases	59		

a. 10 cells (66.7%) have expected count less than 5. The minimum expected count is .36.

```
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```

Nonparametric Correlations

Correlations

			CEX	C_ST6 Students develop knowledge and skills through experience (i.e. real world learning experience such as working with industry experts, presenting results to them etc.)
Spearman's rho	CEX	Correlation Coefficient	1.000	-.398**
		Sig. (2-tailed)	.	.001
		N	72	72
	C_ST6 Students develop knowledge and skills through experience (i.e. real world learning experience such as working with industry experts, presenting results to them etc.)	Correlation Coefficient	-.398**	1.000
		Sig. (2-tailed)	.001	.
		N	72	72

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

```
CROSSTABS
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Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
C_ST6 Students develop knowledge and skills through experience (i.e. real world learning experience such as working with industry experts, presenting results to them etc.) * CEX	72	100.0%	0	0.0%	72	100.0%

C_ST6 Students develop knowledge and skills through experience (i.e. real world learning experience such as working with industry experts, presenting results to them etc.) * CEX Crosstabulation

Count

	CEX			Total
	Low	Medium	High	

C_ST6 Students develop knowledge and skills through experience (i.e. real world learning experience such as working with industry experts, presenting results to them etc.)	Not at all	0	3	17	20
	Slightly	0	6	8	14
	Moderately	2	5	7	14
	Considerably	4	3	7	14
	To the full extent	3	4	3	10
Total		9	21	42	72

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.951[a]	8	.031
Likelihood Ratio	19.895	8	.011
Linear-by-Linear Association	12.366	1	.000
N of Valid Cases	72		

a. 9 cells (60.0%) have expected count less than 5. The minimum expected count is 1.25.

```
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```

Nonparametric Correlations

Correlations

			CEX	C_ES3 As part of the feedback sessions, students are asked to raise critical questions
Spearman's rho	CEX	Correlation Coefficient	1.000	-.392**
		Sig. (2-tailed)	.	.001
		N	72	72
	C_ES3 As part of the feedback sessions, students are asked to raise critical questions	Correlation Coefficient	-.392**	1.000
		Sig. (2-tailed)	.001	.
		N	72	72

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

```
CROSSTABS
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 /FORMAT=AVALUE TABLES
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 /CELLS=COUNT
 /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
C_ES3 As part of the feedback sessions, students are asked to raise critical questions * CEX	72	100.0%	0	0.0%	72	100.0%

C_ES3 As part of the feedback sessions, students are asked to raise critical questions * CEX Crosstabulation

Count

		CEX			
		Low	Medium	High	Total
C_ES3 As part of the feedback sessions, students are asked to raise critical questions	Not at all	0	1	8	9
	Slightly	0	4	7	11
	Moderately	1	2	11	14
	Considerably	3	9	11	23
	To the full extent	5	5	5	15
Total		9	21	42	72

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.691[a]	8	.047
Likelihood Ratio	17.093	8	.029
Linear-by-Linear Association	10.966	1	.001
N of Valid Cases	72		

a. 9 cells (60.0%) have expected count less than 5. The minimum expected count is 1.13.

```
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```

Nonparametric Correlations

Correlations

			CEX	C_TR7 A substantial part of the learning activities are dedicated to students reflecting on the learning process
Spearman's rho	CEX	Correlation Coefficient	1.000	-.297*
		Sig. (2-tailed)	.	.011
		N	72	72
	C_TR7 A substantial part of the learning activities are dedicated to students reflecting on the learning process	Correlation Coefficient	-.297*	1.000
		Sig. (2-tailed)	.011	.
		N	72	72

*. Correlation is significant at the 0.05 level (2-tailed).

```
CROSSTABS
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 /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
C_TR7 A substantial part of the learning activities are dedicated to students reflecting on the learning process * CEX	72	100.0%	0	0.0%	72	100.0%

C_TR7 A substantial part of the learning activities are dedicated to students reflecting on the learning process * CEX Crosstabulation

Count

		CEX			Total
		Low	Medium	High	
C_TR7 A substantial part of the learning activities are dedicated to students reflecting on the learning process	Not at all	0	3	10	13
	Slightly	2	5	13	20
	Moderately	2	5	11	18
	Considerably	4	4	6	14
	To the full extent	1	4	2	7
Total		9	21	42	72

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.424[a]	8	.308
Likelihood Ratio	10.112	8	.257
Linear-by-Linear Association	6.354	1	.012
N of Valid Cases	72		

a. 9 cells (60.0%) have expected count less than 5. The minimum expected count is .88.

```
NONPAR CORR
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```

Nonparametric Correlations

Correlations

			CEX	C_TR4 We have reserved an additional workspace for students to use freely whenever they need it
Spearman's rho	CEX	Correlation Coefficient	1.000	-.351**
		Sig. (2-tailed)	.	.003
		N	72	72
	C_TR4 We have reserved an additional workspace for students to use freely whenever they need it	Correlation Coefficient	-.351**	1.000
		Sig. (2-tailed)	.003	.
		N	72	72

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

```
CROSSTABS
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 /FORMAT=AVALUE TABLES
 /STATISTICS=CHISQ
 /CELLS=COUNT
 /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
C_TR4 We have reserved an additional workspace for students to use freely whenever they need it * CEX	72	100.0%	0	0.0%	72	100.0%

C_TR4 We have reserved an additional workspace for students to use freely whenever they need it * CEX Crosstabulation

Count

		CEX			Total
		Low	Medium	High	
C_TR4 We have reserved an additional workspace for students to use freely whenever they need it	Not at all	1	11	27	39
	Slightly	1	2	6	9
	Moderately	1	3	3	7
	Considerably	4	3	5	12
	To the full extent	2	2	1	5
Total		9	21	42	72

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)

Pearson Chi-Square	14.207[a]	8	.077
Likelihood Ratio	13.680	8	.090
Linear-by-Linear Association	11.385	1	.001
N of Valid Cases	72		

a. 11 cells (73.3%) have expected count less than 5. The minimum expected count is .63.

```
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 /MISSING=PAIRWISE.
```

Nonparametric Correlations

Correlations

			CEX	C_FLP10 Students choose the key learning materials themselves
Spearman's rho	CEX	Correlation Coefficient	1.000	-.333**
		Sig. (2-tailed)	.	.004

		N	72	72
	C_FLP10 Students choose the key learning materials themselves	Correlation Coefficient	-.333**	1.000
		Sig. (2-tailed)	.004	.
		N	72	72

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

```
CROSSTABS
 /TABLES=C_FLP10 BY Category_yearsofexperience
 /FORMAT=AVALUE TABLES
 /STATISTICS=CHISQ
 /CELLS=COUNT
 /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
C_FLP10 Students choose the key learning materials themselves * CEX	72	100.0%	0	0.0%	72	100.0%

C_FLP10 Students choose the key learning materials themselves * CEX Crosstabulation

Count

		CEX			
		Low	Medium	High	Total
C_FLP10 Students choose the key learning materials themselves	Not at all	0	2	15	17
	Slightly	3	7	13	23
	Moderately	4	3	7	14
	Considerably	2	7	6	15
	To the full extent	0	2	1	3
Total		9	21	42	72

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.464[a]	8	.070
Likelihood Ratio	15.918	8	.044
Linear-by-Linear Association	6.061	1	.014
N of Valid Cases	72		

a. 10 cells (66.7%) have expected count less than 5. The minimum expected count is .38.

NONPAR CORR

/VARIABLES=Category_yearsofexperience C_ST7

```
/PRINT=SPEARMAN TWOTAIL NOSIG
/MISSING=PAIRWISE.
```

Nonparametric Correlations

Correlations

			CEX	C_ST7 The solution/conclusion reflects the ethical considerations of the stakeholders affected by the solution
Spearman's rho	CEX	Correlation Coefficient	1.000	-.355**
		Sig. (2-tailed)	.	.002
		N	72	72
	C_ST7 The solution/conclusion reflects the ethical considerations of the stakeholders affected by the solution	Correlation Coefficient	-.355**	1.000
		Sig. (2-tailed)	.002	.
		N	72	72

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

```
CROSSTABS
```

```
/TABLES=C_ST7 BY Category_yearsofexperience
/FORMAT=AVALUE TABLES
/STATISTICS=CHISQ
/CELLS=COUNT
/COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
C_ST7 The solution/conclusion reflects the ethical considerations of the stakeholders affected by the solution * CEX	72	100.0%	0	0.0%	72	100.0%

C_ST7 The solution/conclusion reflects the ethical considerations of the stakeholders affected by the solution * CEX Crosstabulation

Count

	CEX			Total
	Low	Medium	High	

C_ST7 The solution/conclusion reflects the ethical considerations of the stakeholders affected by the solution	Not at all	1	4	16	21
	Slightly	1	2	11	14
	Moderately	2	7	7	16
	Considerably	2	3	4	9
	To the full extent	3	5	4	12
Total		9	21	42	72

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	11.469[a]	8	.177
Likelihood Ratio	11.610	8	.169
Linear-by-Linear Association	8.687	1	.003
N of Valid Cases	72		

a. 9 cells (60.0%) have expected count less than 5. The minimum expected count is 1.13.

```
NONPAR CORR
 /VARIABLES=Category_yearsofexperience P_FLP10
 /PRINT=SPEARMAN TWOTAIL NOSIG
 /MISSING=PAIRWISE.
```

Nonparametric Correlations

Correlations

			CEX	P_FLP10 Students could choose the key learning materials themselves
Spearman's rho	CEX	Correlation Coefficient	1.000	-.280*
		Sig. (2-tailed)	.	.017
		N	72	72
	P_FLP10 Students could choose the key learning materials themselves	Correlation Coefficient	-.280*	1.000
		Sig. (2-tailed)	.017	.
		N	72	72

*. Correlation is significant at the 0.05 level (2-tailed).

```
CROSSTABS
 /TABLES=P_FLP10 BY Category_yearsofexperience
 /FORMAT=AVALUE TABLES
 /STATISTICS=CHISQ
 /CELLS=COUNT
 /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
P_FLP10 Students could choose the key learning materials themselves * CEX	72	100.0%	0	0.0%	72	100.0%

P_FLP10 Students could choose the key learning materials themselves * CEX Crosstabulation

Count

		CEX			Total
		Low	Medium	High	
P_FLP10 Students could choose the key learning materials themselves	Definitely not	0	1	4	5
	Probably not	2	2	18	22
	Possibly	5	7	10	22
	Probably	2	4	5	11
	Definitely	0	7	5	12
Total		9	21	42	72

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.379[a]	8	.052
Likelihood Ratio	17.330	8	.027
Linear-by-Linear Association	3.005	1	.083
N of Valid Cases	72		

a. 9 cells (60.0%) have expected count less than 5. The minimum expected count is .63.

```
NONPAR CORR
 /VARIABLES=Category_yearsofexperience P_ES2
 /PRINT=SPEARMAN TWOTAIL NOSIG
 /MISSING=PAIRWISE.
```

Nonparametric Correlations

Correlations

			CEX	P_ES2 Students could discuss ongoing contradicting viewpoints lingering within and outside the course discipline
Spearman's rho	CEX	Correlation Coefficient	1.000	-.162
		Sig. (2-tailed)	.	.174
		N	72	72
	P_ES2 Students could discuss ongoing contradicting viewpoints lingering within and outside the course discipline	Correlation Coefficient	-.162	1.000
		Sig. (2-tailed)	.174	.
		N	72	72

```
CROSSTABS
  /TABLES=P_ES2 BY Category_yearsofexperience
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT
  /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
P_ES2 Students could discuss ongoing contradicting viewpoints lingering within and outside the course discipline * CEX	72	100.0%	0	0.0%	72	100.0%

P_ES2 Students could discuss ongoing contradicting viewpoints lingering within and outside the course discipline * CEX Crosstabulation

Count

		CEX			
		Low	Medium	High	Total
P_ES2 Students could discuss ongoing contradicting viewpoints lingering within and outside the course discipline	Definitely not	0	0	3	3
	Probably not	0	2	9	11
	Possibly	4	8	10	22
	Probably	2	5	9	16
	Definitely	2	6	11	19
	999	1	0	0	1
Total		9	21	42	72

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.731[a]	10	.186
Likelihood Ratio	13.265	10	.209
Linear-by-Linear Association	4.313	1	.038
N of Valid Cases	72		

a. 12 cells (66.7%) have expected count less than 5. The minimum expected count is .13.

```
NONPAR CORR
 /VARIABLES=Category_yearsofexperience P_FLP6
 /PRINT=SPEARMAN TWOTAIL NOSIG
 /MISSING=PAIRWISE.
```

Nonparametric Correlations

Correlations

			CEX	P_FLP6 Students could develop their own learning goals in line with the existing Program-level Intended Learning Outcomes (PILO's)
Spearman's rho	CEX	Correlation Coefficient	1.000	-.392**
		Sig. (2-tailed)	.	.001
		N	72	72
	P_FLP6 Students could develop their own learning goals in line with the existing Program-level Intended Learning Outcomes (PILO's)	Correlation Coefficient	-.392**	1.000
		Sig. (2-tailed)	.001	.
		N	72	72

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

```
CROSSTABS
 /TABLES=P_FLP6 BY Category_yearsofexperience
 /FORMAT=AVALUE TABLES
 /STATISTICS=CHISQ
 /CELLS=COUNT
 /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
P_FLP6 Students could develop their own learning goals in line with the existing Program-level Intended Learning Outcomes (PILO's) * CEX	72	100.0%	0	0.0%	72	100.0%

P_FLP6 Students could develop their own learning goals in line with the existing Program-level Intended Learning Outcomes (PILO's) * CEX Crosstabulation

Count

		CEX			Total
		Low	Medium	High	
P_FLP6 Students could develop their own learning goals in line with the existing Program-level Intended	Definitely not	1	0	8	9
	Probably not	0	8	19	27
	Possibly	4	6	11	21
	Probably	4	6	2	12

Learning Outcomes (PILO's) Definitely	0	1	2	3
Total	9	21	42	72

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	18.930[a]	8	.015
Likelihood Ratio	24.744	8	.002
Linear-by-Linear Association	8.930	1	.003
N of Valid Cases	72		

a. 9 cells (60.0%) have expected count less than 5. The minimum expected count is .38.

```
NONPAR CORR
 /VARIABLES=Category_yearsofexperience P_RW2
 /PRINT=SPEARMAN TWOTAIL NOSIG
 /MISSING=PAIRWISE.
```

Nonparametric Correlations

Correlations

			CEX	P_RW2 Students could take risk and experiment to critically explore and assess the boundaries of their learning object
Spearman's rho	CEX	Correlation Coefficient	1.000	-.298*
		Sig. (2-tailed)	.	.011
		N	72	72
	P_RW2 Students could take risk and experiment to critically explore and assess the boundaries of their learning object	Correlation Coefficient	-.298*	1.000
		Sig. (2-tailed)	.011	.
		N	72	72

*. Correlation is significant at the 0.05 level (2-tailed).

```
CROSSTABS
 /TABLES=P_RW2 BY Category_yearsofexperience
 /FORMAT=AVALUE TABLES
 /STATISTICS=CHISQ
 /CELLS=COUNT
 /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
P_RW2 Students could take risk and experiment to critically explore and assess the boundaries of their learning object * CEX	72	100.0%	0	0.0%	72	100.0%

P_RW2 Students could take risk and experiment to critically explore and assess the boundaries of their learning object * CEX Crosstabulation

Count

		CEX			Total
		Low	Medium	High	
P_RW2 Students could take risk and experiment to critically explore and assess the boundaries of their learning object	Definitely not	0	1	4	5
	Probably not	0	1	8	9
	Possibly	3	5	12	20
	Probably	2	6	10	18
	Definitely	4	8	8	20
Total		9	21	42	72

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.987[a]	8	.435
Likelihood Ratio	9.742	8	.284
Linear-by-Linear Association	5.973	1	.015
N of Valid Cases	72		

a. 8 cells (53.3%) have expected count less than 5. The minimum expected count is .63.

```
NONPAR CORR
 /VARIABLES=Category_yearsofexperience P_ST5
 /PRINT=SPEARMAN TWOTAIL NOSIG
 /MISSING=PAIRWISE.
```

Nonparametric Correlations

Correlations

			CEX	P_ST5 The educator could provide students with a variety of learning partners within as well as outside the campus on a regular basis
Spearman's rho	CEX	Correlation Coefficient	1.000	-.220
		Sig. (2-tailed)	.	.063
		N	72	72
	P_ST5 The educator could provide students with a variety of learning partners within as well as outside the campus on a regular basis	Correlation Coefficient	-.220	1.000
		Sig. (2-tailed)	.063	.
		N	72	72

```
CROSSTABS
 /TABLES=P_ST5 BY Category_yearsofexperience
 /FORMAT=AVALUE TABLES
 /STATISTICS=CHISQ
 /CELLS=COUNT
 /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
P_ST5 The educator could provide students with a variety of learning partners within as well as outside the campus on a regular basis * CEX	72	100.0%	0	0.0%	72	100.0%

P_ST5 The educator could provide students with a variety of learning partners within as well as outside the campus on a regular basis * CEX Crosstabulation

Count

		CEX			Total
		Low	Medium	High	
P_ST5 The educator could provide students with a variety of learning partners within as well as outside the campus on a regular basis	Definitely not	0	0	8	8
	Probably not	3	5	13	21
	Possibly	4	6	10	20
	Probably	2	4	6	12
	Definitely	0	6	5	11
Total		9	21	42	72

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	11.661[a]	8	.167
Likelihood Ratio	15.342	8	.053
Linear-by-Linear Association	2.052	1	.152
N of Valid Cases	72		

a. 9 cells (60.0%) have expected count less than 5. The minimum expected count is 1.00.

8.5.3. Linear Regression Analysis

```
REGRESSION
 /DESCRIPTIVES MEAN STDDEV CORR SIG N
 /MISSING LISTWISE
 /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
 /CRITERIA=PIN(.05) POUT(.10)
 /NOORIGIN
 /DEPENDENT P_Stakeholder
 /METHOD=ENTER C_Stakeholder
 /SCATTERPLOT=(*ZRESID ,*ZPRED)
 /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Stakeholder involvement	2.9613	1.05580	72
Current Stakeholder involvement	2.3517	1.08725	72

Correlations

		Potential Stakeholder involvement	Current Stakeholder involvement
Pearson Correlation	Potential Stakeholder involvement	1.000	.664
	Current Stakeholder involvement	.664	1.000
Sig. (1-tailed)	Potential Stakeholder involvement	.	.000
	Current Stakeholder involvement	.000	.
N	Potential Stakeholder involvement	72	72
	Current Stakeholder involvement	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method

1	Current Stakeholder involvement[b]	.	Enter

a. Dependent Variable: Potential Stakeholder involvement

b. All requested variables entered.

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.664[a]	.441	.433	.79488	.441	55.261	1	70	.000

a. Predictors: (Constant), Current Stakeholder involvement

b. Dependent Variable: Potential Stakeholder involvement

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34.916	1	34.916	55.261	.000[b]
	Residual	44.229	70	.632		
	Total	79.145	71			

a. Dependent Variable: Potential Stakeholder involvement

b. Predictors: (Constant), Current Stakeholder involvement

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.444	.225		6.434	.000	.997	1.892
	Current Stakeholder involvement	.645	.087	.664	7.434	.000	.472	.818

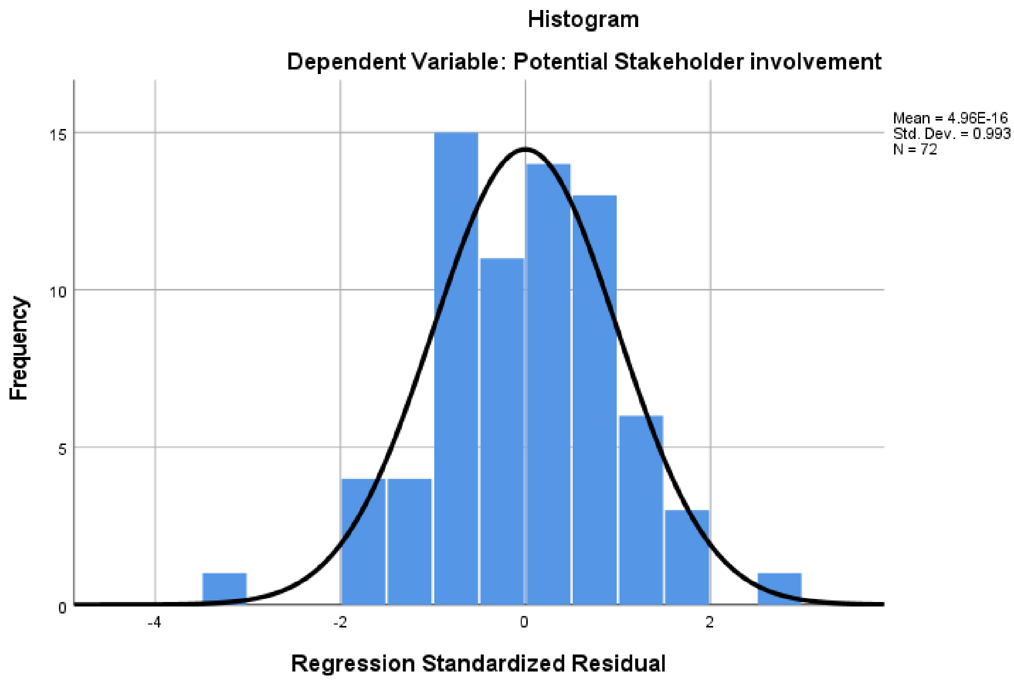
a. Dependent Variable: Potential Stakeholder involvement

Residuals Statistics[a]

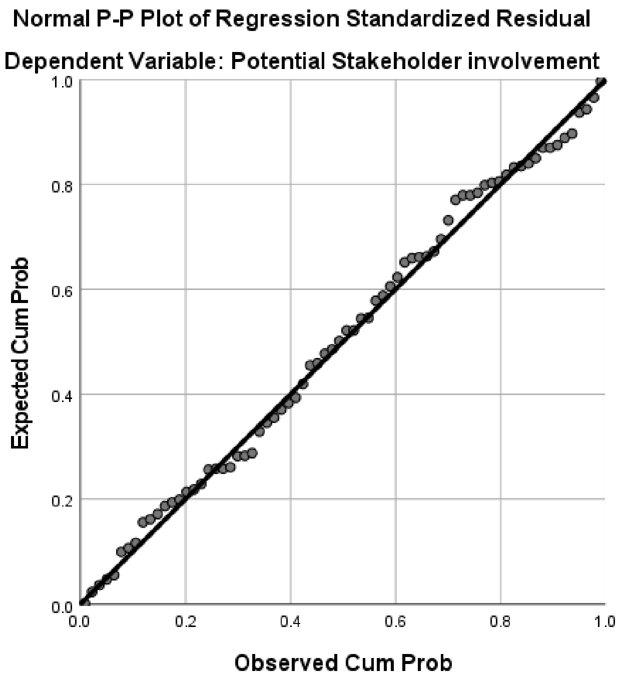
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.0895	4.6695	2.9613	.70127	72
Residual	-2.39134	2.14053	.00000	.78927	72
Std. Predicted Value	-1.243	2.436	.000	1.000	72
Std. Residual	-3.008	2.693	.000	.993	72

a. Dependent Variable: Potential Stakeholder involvement

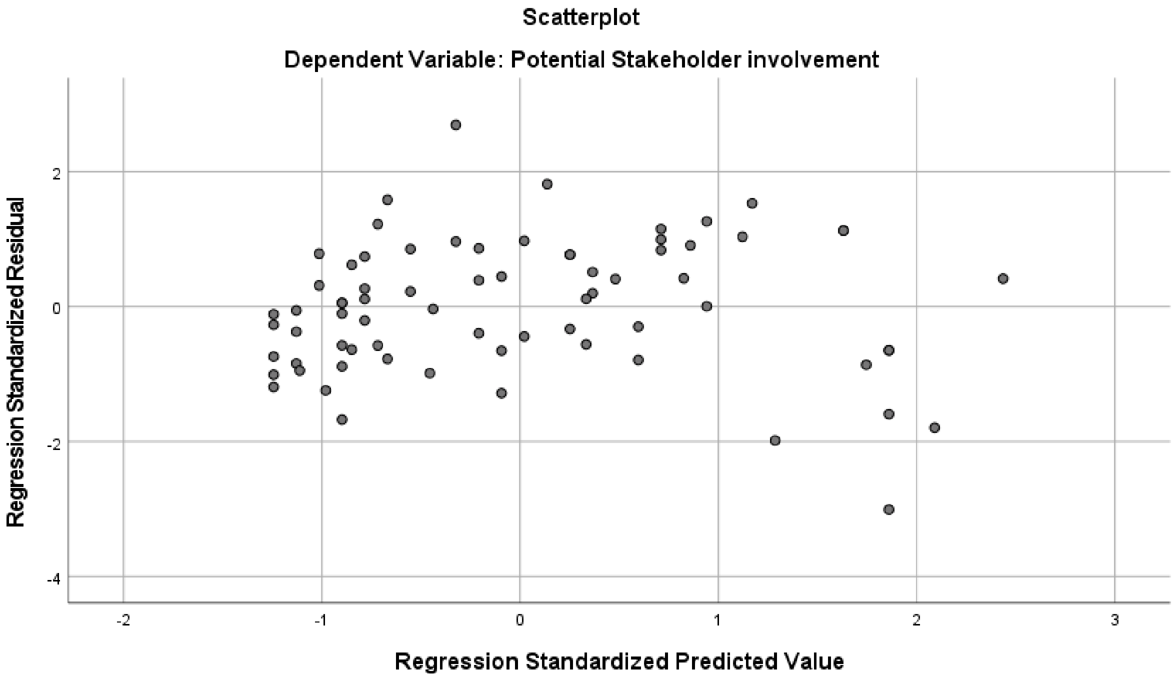
Charts



Histogram
Dependent Variable: Potential Stakeholder involvement
Mean = 4.96E-16
Std. Dev. = 0.993
N = 72
Frequency
15
10
5
0
-4
-2
0
2
Regression Standardized Residual



Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Stakeholder involvement
Expected Cum Prob
1.0
0.8
0.6
0.4
0.2
0.0
Observed Cum Prob

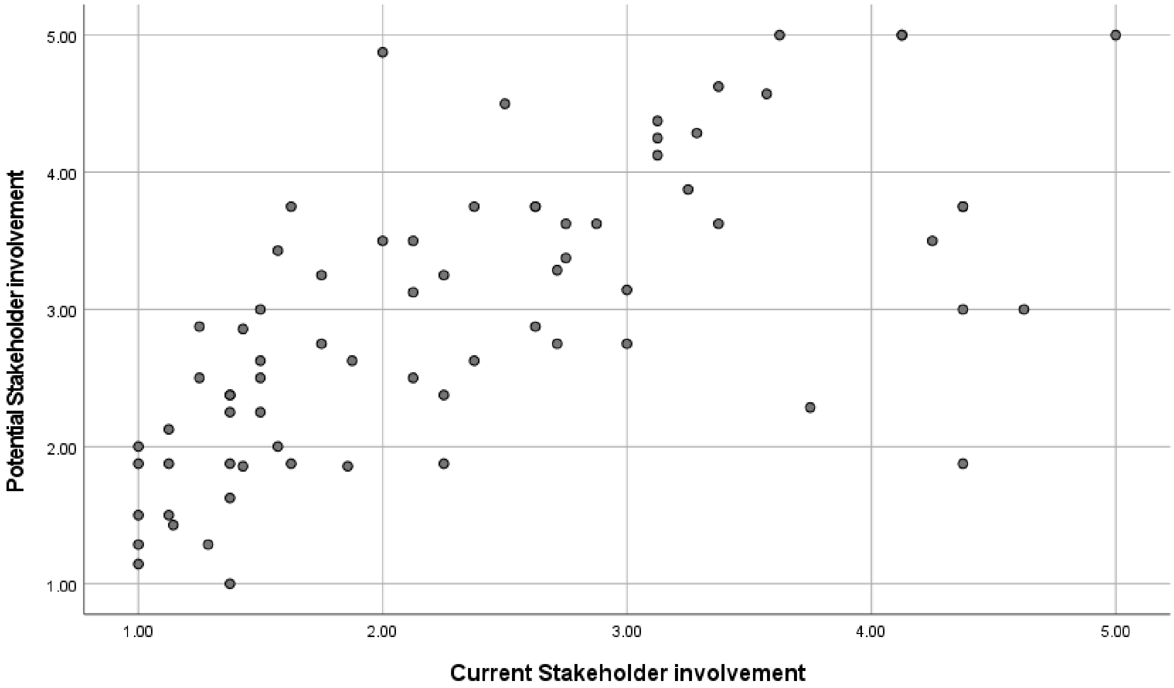


GRAPH

/SCATTERPLOT(BIVAR)=C_Stakeholder WITH P_Stakeholder

/MISSING=LISTWISE.

Graph




```
REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT C_Stakeholder
  /METHOD=ENTER P_Stakeholder
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Current Stakeholder involvement	2.3517	1.08725	72
Potential Stakeholder involvement	2.9613	1.05580	72

Correlations

		Current Stakeholder involvement	Potential Stakeholder involvement
Pearson Correlation	Current Stakeholder involvement	1.000	.664
	Potential Stakeholder involvement	.664	1.000
Sig. (1-tailed)	Current Stakeholder involvement	.	.000
	Potential Stakeholder involvement	.000	.
N	Current Stakeholder involvement	72	72
	Potential Stakeholder involvement	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Potential Stakeholder involvement[b]	.	Enter

a. Dependent Variable: Current Stakeholder involvement

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.664[a]	.441	.433	.81856	.441	55.261	1	70	.000

a. Predictors: (Constant), Potential Stakeholder involvement

b. Dependent Variable: Current Stakeholder involvement

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	37.027	1	37.027	55.261	.000[b]
	Residual	46.902	70	.670		
	Total	83.930	71			

a. Dependent Variable: Current Stakeholder involvement

b. Predictors: (Constant), Potential Stakeholder involvement

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.326	.289		1.129	.263	-.250	.903
	Potential Stakeholder involvement	.684	.092	.664	7.434	.000	.500	.867

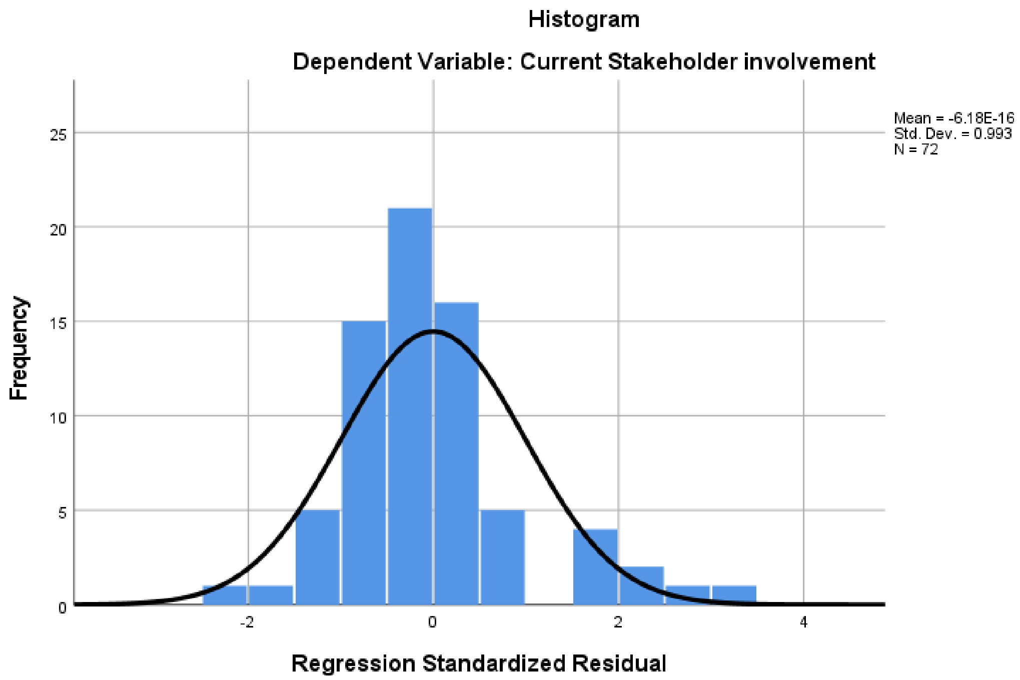
a. Dependent Variable: Current Stakeholder involvement

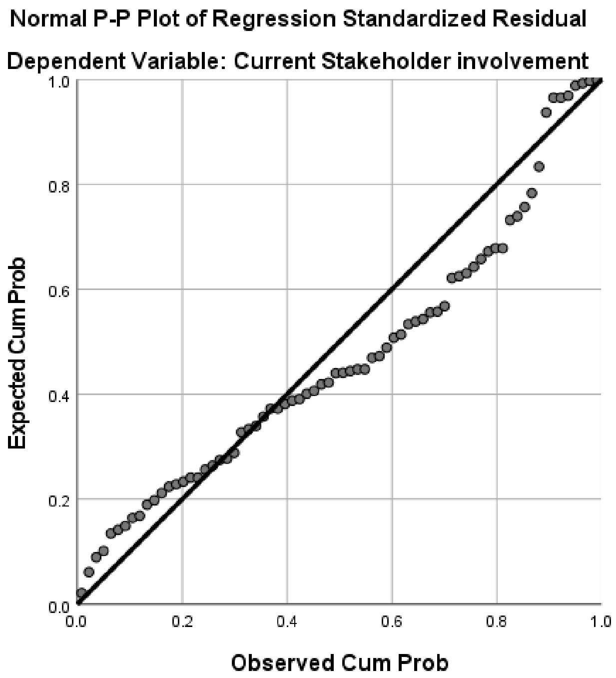
Residuals Statistics[a]

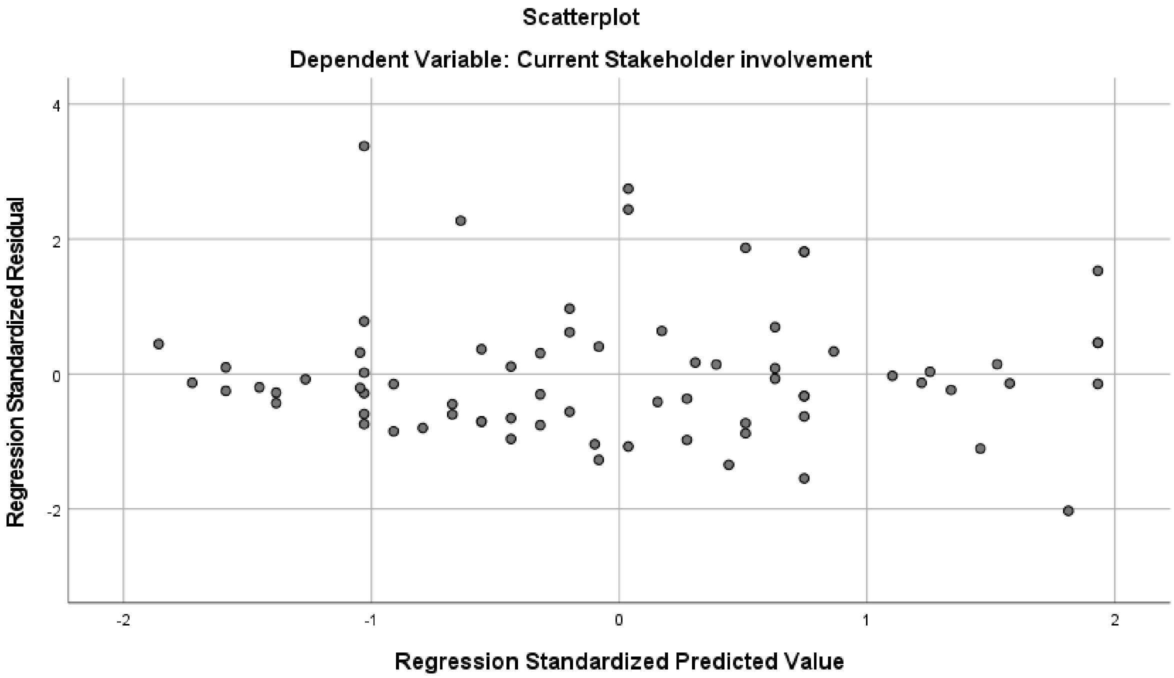
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.0102	3.7461	2.3517	.72216	72
Residual	-1.66062	2.76633	.00000	.81277	72
Std. Predicted Value	-1.858	1.931	.000	1.000	72
Std. Residual	-2.029	3.380	.000	.993	72

a. Dependent Variable: Current Stakeholder involvement

Charts


Histogram
Dependent Variable: Current Stakeholder involvement
Mean = -6.18E-16
Std. Dev. = 0.993
N = 72
Frequency
25
20
15
10
5
0
-2
0
2
4
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Current Stakeholder involvement
Expected Cum Prob
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Observed Cum Prob




```
REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Flexible_Learning_Path
  /METHOD=ENTER C_Flexible_learning_path
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Flexible Learning path	2.9609	.84345	72
Current Flexible learning path	2.3191	.77210	72

Correlations

		Potential Flexible Learning path	Current Flexible learning path
Pearson Correlation	Potential Flexible Learning path	1.000	.670
	Current Flexible learning path	.670	1.000
Sig. (1-tailed)	Potential Flexible Learning path	.	.000
	Current Flexible learning path	.000	.
N	Potential Flexible Learning path	72	72
	Current Flexible learning path	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Flexible learning path[b]	.	Enter

a. Dependent Variable: Potential Flexible Learning path

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.670[a]	.449	.441	.63034	.449	57.123	1	70	.000

a. Predictors: (Constant), Current Flexible learning path

b. Dependent Variable: Potential Flexible Learning path

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22.697	1	22.697	57.123	.000[b]
	Residual	27.813	70	.397		
	Total	50.510	71			

a. Dependent Variable: Potential Flexible Learning path

b. Predictors: (Constant), Current Flexible learning path

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.263	.237		5.335	.000	.791	1.735
	Current Flexible learning path	.732	.097	.670	7.558	.000	.539	.926

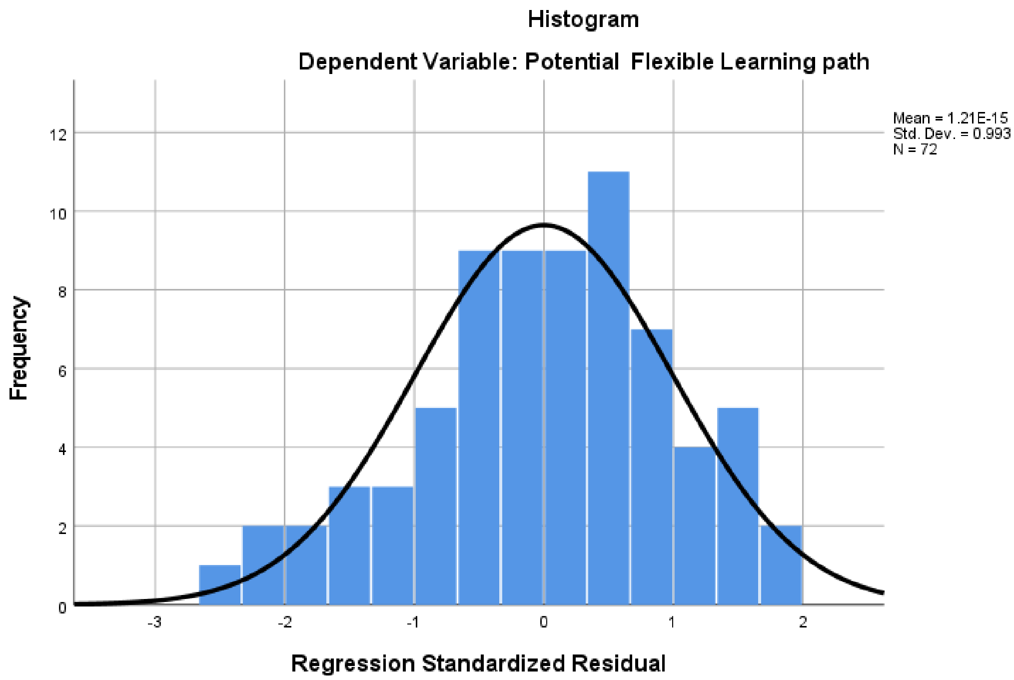
a. Dependent Variable: Potential Flexible Learning path

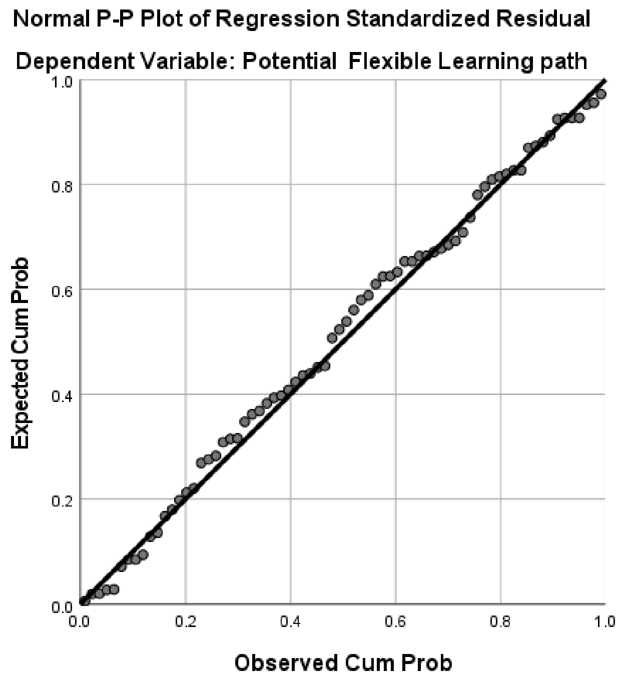
Residuals Statistics[a]

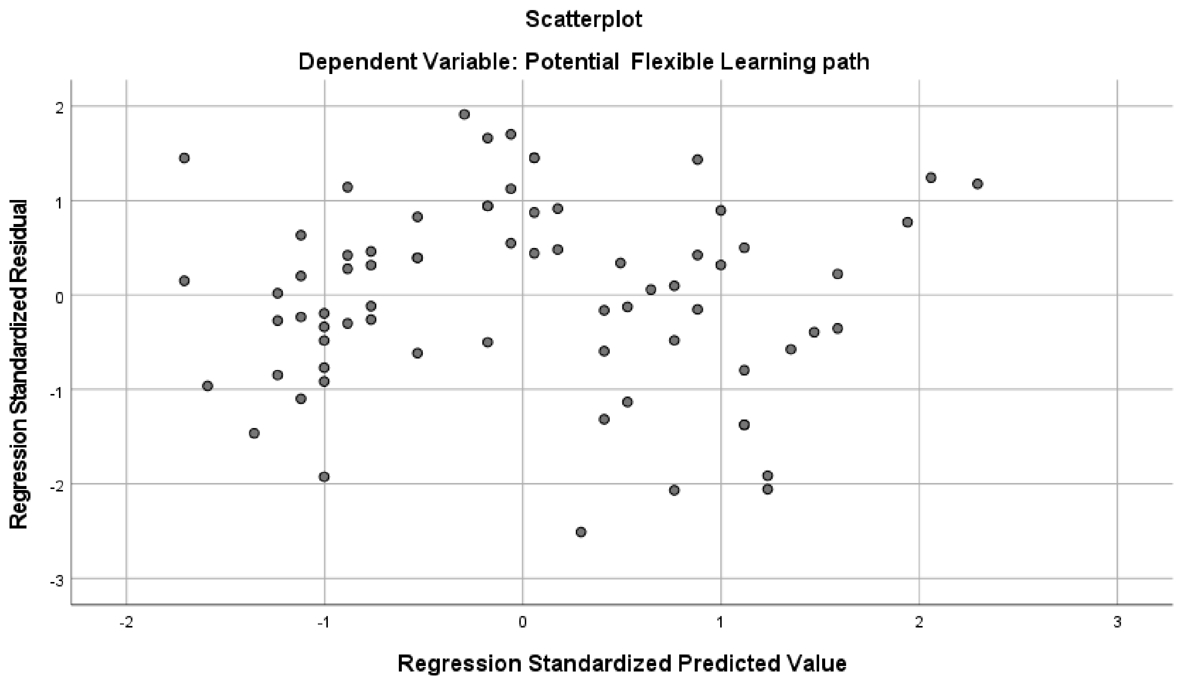
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.9949	4.2583	2.9609	.56539	72
Residual	-1.58118	1.20622	.00000	.62589	72
Std. Predicted Value	-1.708	2.295	.000	1.000	72
Std. Residual	-2.508	1.914	.000	.993	72

a. Dependent Variable: Potential Flexible Learning path

Charts


Histogram
Dependent Variable: Potential Flexible Learning path
Mean = 1.21E-15
Std. Dev. = 0.993
N = 72
Frequency
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Flexible Learning path
Expected Cum Prob
Observed Cum Prob

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REGRESSION
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  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Real_World_Experience
  /METHOD=ENTER C_Real_world_experience
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Real World Experience	3.4329	1.13932	72
Current Real world experience	2.9306	1.07568	72

Correlations

		Potential Real World Experience	Current Real world experience
Pearson Correlation	Potential Real World Experience	1.000	.709
	Current Real world experience	.709	1.000
Sig. (1-tailed)	Potential Real World Experience	.	.000
	Current Real world experience	.000	.
N	Potential Real World Experience	72	72
	Current Real world experience	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Real world experience[b]	.	Enter

a. Dependent Variable: Potential Real World Experience

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.709[a]	.503	.496	.80872	.503	70.913	1	70	.000

a. Predictors: (Constant), Current Real world experience

b. Dependent Variable: Potential Real World Experience

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46.379	1	46.379	70.913	.000[b]
	Residual	45.782	70	.654		
	Total	92.162	71			

a. Dependent Variable: Potential Real World Experience

b. Predictors: (Constant), Current Real world experience

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.231	.278		4.423	.000	.676	1.786
	Current Real world experience	.751	.089	.709	8.421	.000	.573	.929

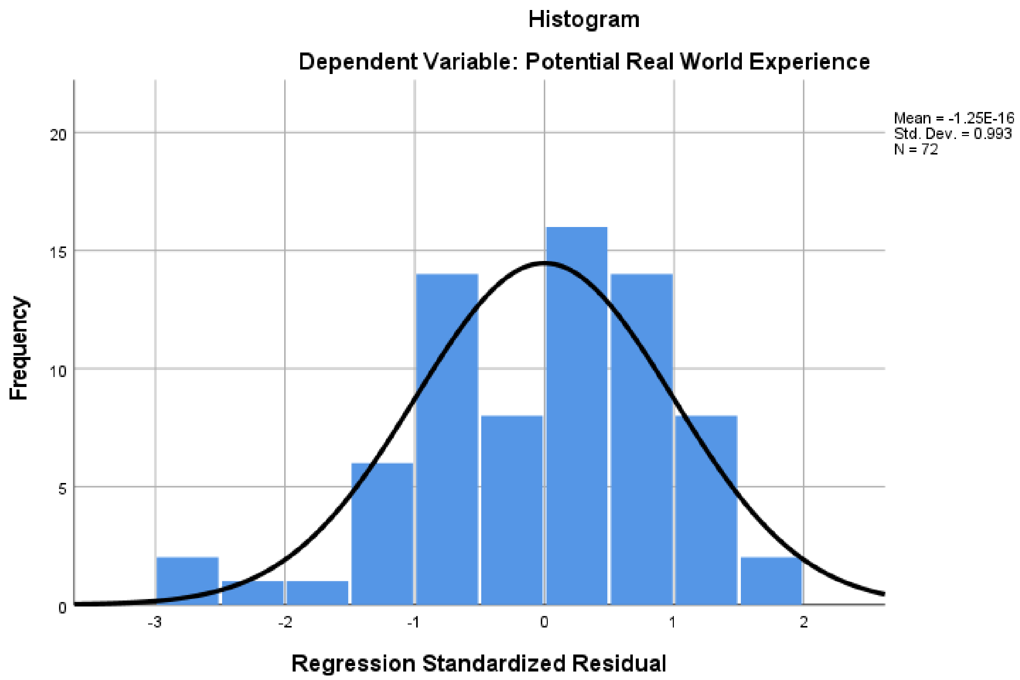
a. Dependent Variable: Potential Real World Experience

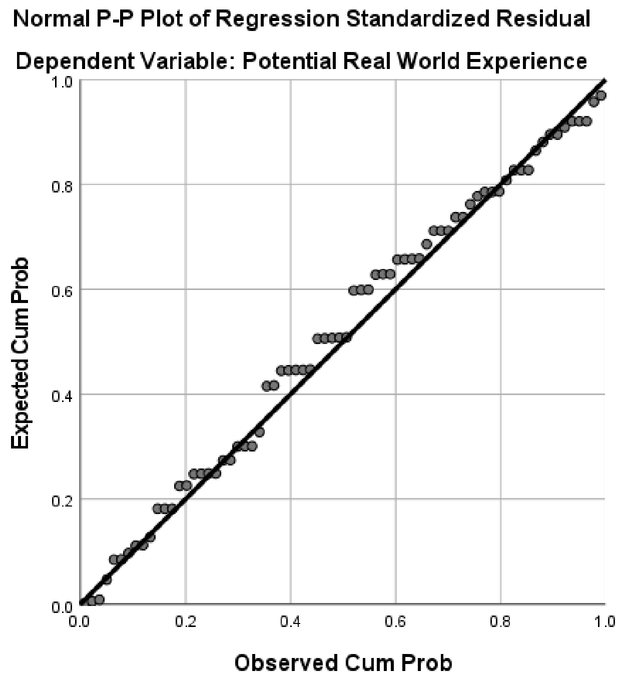
Residuals Statistics[a]

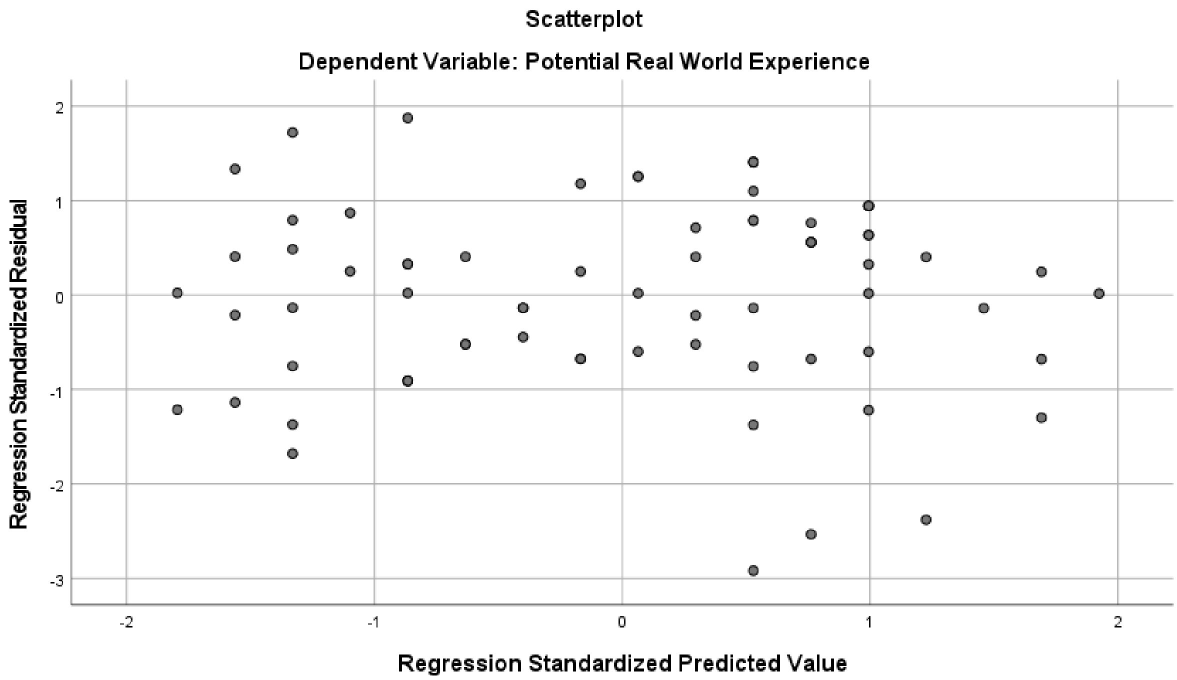
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.9823	4.9878	3.4329	.80823	72
Residual	-2.36073	1.51632	.00000	.80301	72
Std. Predicted Value	-1.795	1.924	.000	1.000	72
Std. Residual	-2.919	1.875	.000	.993	72

a. Dependent Variable: Potential Real World Experience

Charts


Histogram
Dependent Variable: Potential Real World Experience
Mean = -1.25E-16
Std. Dev. = 0.993
N = 72
Frequency
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Real World Experience
Expected Cum Prob
Observed Cum Prob

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REGRESSION
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  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
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  /NOORIGIN
  /DEPENDENT P_Enterprise_skills
  /METHOD=ENTER C_Enterprise_skills
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Enterprise_skills	3.5810	1.00857	72
Current Enterprise skills	2.8785	.98492	72

Correlations

		Potential Enterprise_skills	Current Enterprise skills
Pearson Correlation	Potential Enterprise_skills	1.000	.430
	Current Enterprise skills	.430	1.000
Sig. (1-tailed)	Potential Enterprise_skills	.	.000
	Current Enterprise skills	.000	.
N	Potential Enterprise_skills	72	72
	Current Enterprise skills	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method

1	Current Enterprise skills[b]	.	Enter

a. Dependent Variable: Potential Enterprise_skills

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.430[a]	.185	.173	.91714	.185	15.861	1	70	.000

a. Predictors: (Constant), Current Enterprise skills

b. Dependent Variable: Potential Enterprise_skills

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.341	1	13.341	15.861	.000[b]
	Residual	58.880	70	.841		
	Total	72.222	71			

a. Dependent Variable: Potential Enterprise_skills

b. Predictors: (Constant), Current Enterprise skills

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	Upper Bound
1	(Constant)	2.314	.336		6.888	.000	1.644	2.984
	Current Enterprise skills	.440	.111	.430	3.983	.000	.220	.661

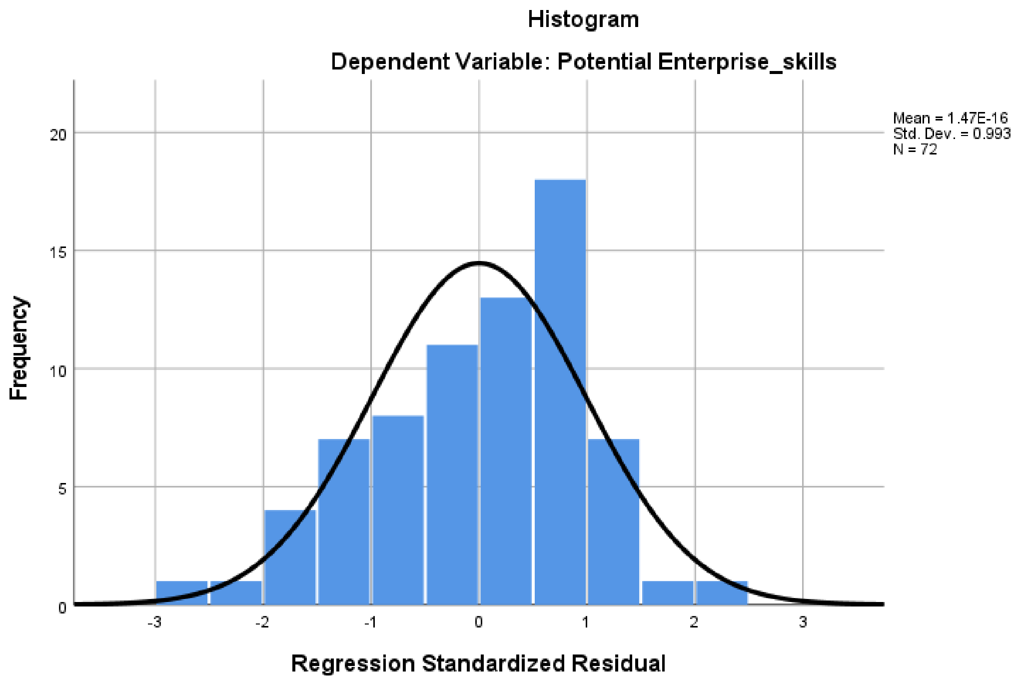
a. Dependent Variable: Potential Enterprise_skills

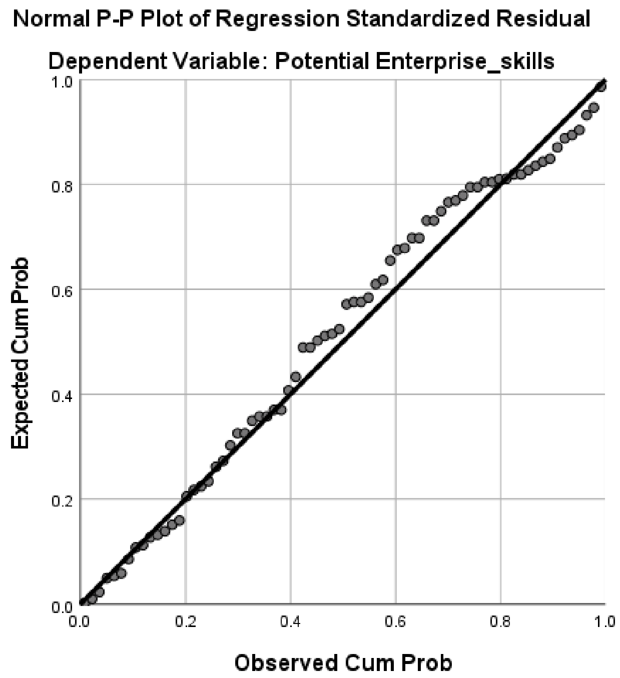
Residuals Statistics[a]

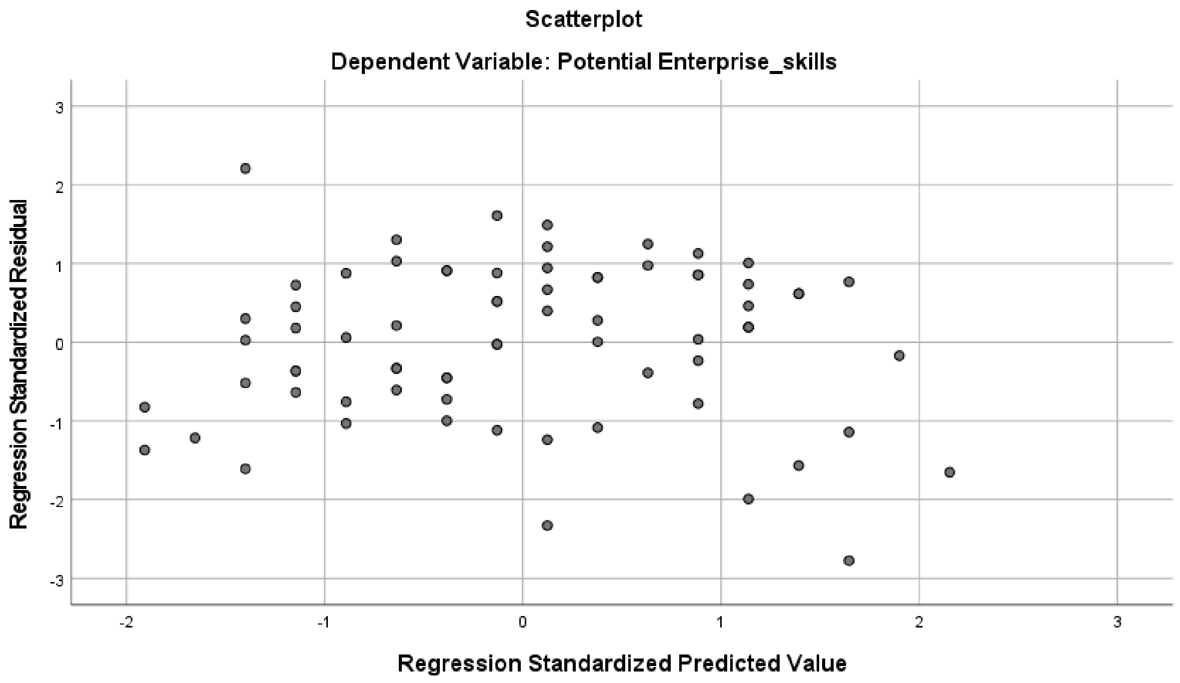
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.7543	4.5148	3.5810	.43348	72
Residual	-2.54469	2.02568	.00000	.91066	72
Std. Predicted Value	-1.907	2.154	.000	1.000	72
Std. Residual	-2.775	2.209	.000	.993	72

a. Dependent Variable: Potential Enterprise_skills

Charts


Histogram
Dependent Variable: Potential Enterprise_skills
Mean = 1.47E-16
Std. Dev. = 0.993
N = 72
Frequency
20
15
10
5
0
-3
-2
-1
0
1
2
3
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Enterprise_skills
Expected Cum Prob
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Observed Cum Prob

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REGRESSION
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  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
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  /NOORIGIN
  /DEPENDENT P_Teacher_Role
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  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Teacher role	3.3627	.84187	72
Current Teacher role	3.0328	.75518	72

Correlations

		Potential Teacher role	Current Teacher role
Pearson Correlation	Potential Teacher role	1.000	.620
	Current Teacher role	.620	1.000
Sig. (1-tailed)	Potential Teacher role	.	.000
	Current Teacher role	.000	.
N	Potential Teacher role	72	72
	Current Teacher role	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Teacher role[b]	.	Enter

a. Dependent Variable: Potential Teacher role

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.620[a]	.384	.376	.66528	.384	43.694	1	70	.000

a. Predictors: (Constant), Current Teacher role

b. Dependent Variable: Potential Teacher role

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.339	1	19.339	43.694	.000[b]
	Residual	30.982	70	.443		
	Total	50.321	71			

a. Dependent Variable: Potential Teacher role

b. Predictors: (Constant), Current Teacher role

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.267	.327		3.878	.000	.615	1.918
	Current Teacher role	.691	.105	.620	6.610	.000	.483	.900

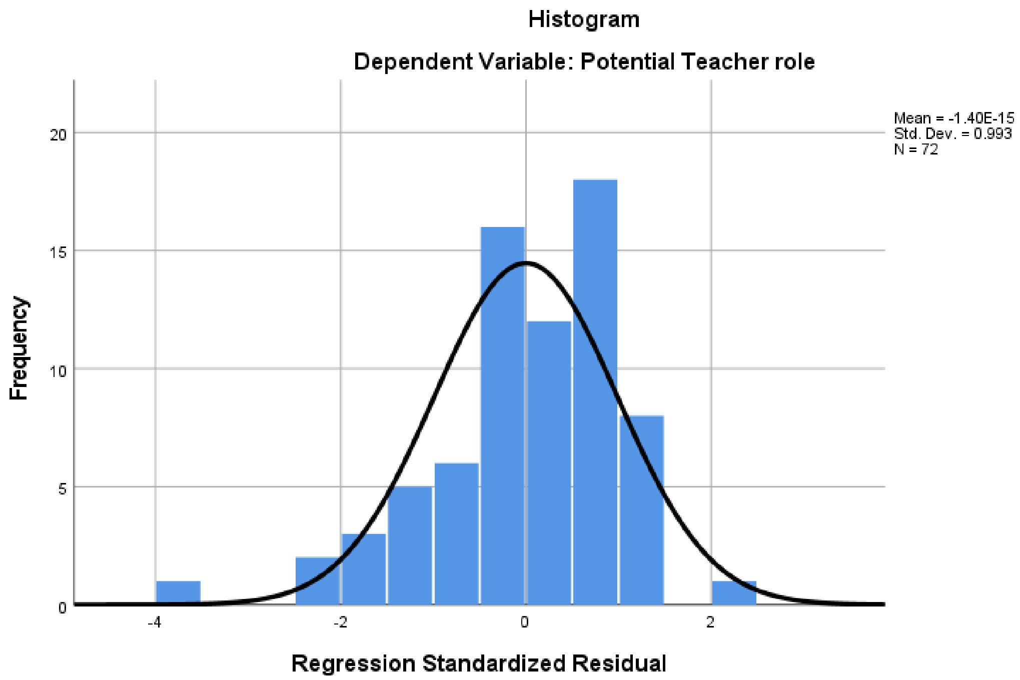
a. Dependent Variable: Potential Teacher role

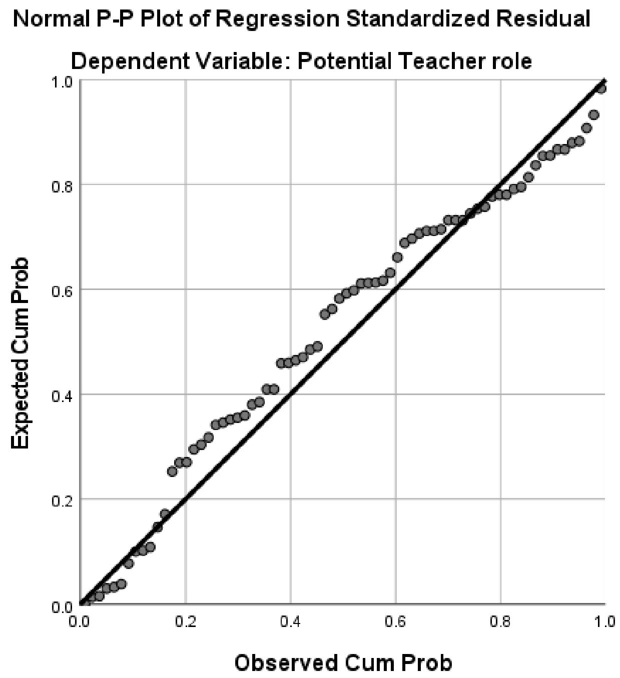
Residuals Statistics[a]

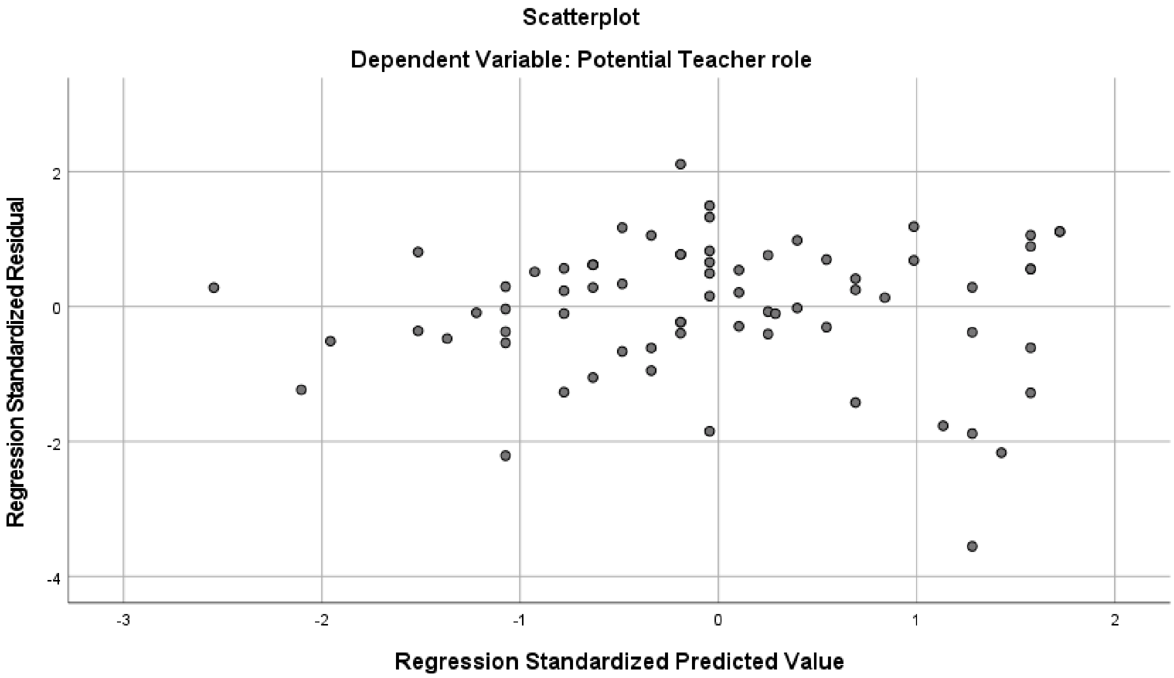
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.0346	4.2614	3.3627	.52190	72
Residual	-2.36442	1.40346	.00000	.66058	72
Std. Predicted Value	-2.545	1.722	.000	1.000	72
Std. Residual	-3.554	2.110	.000	.993	72

a. Dependent Variable: Potential Teacher role

Charts


Histogram
Dependent Variable: Potential Teacher role
Mean = -1.40E-15
Std. Dev. = 0.993
N = 72
Frequency
0
5
10
15
20
-4
-2
0
2
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Teacher role
Expected Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0
Observed Cum Prob

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  /NOORIGIN
  /DEPENDENT P_Flexible_Learning_Path
  /METHOD=ENTER C_Stakeholder
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Flexible Learning path	2.9609	.84345	72
Current Stakeholder involvement	2.3517	1.08725	72

Correlations

		Potential Flexible Learning path	Current Stakeholder involvement
Pearson Correlation	Potential Flexible Learning path	1.000	.424
	Current Stakeholder involvement	.424	1.000
Sig. (1-tailed)	Potential Flexible Learning path	.	.000
	Current Stakeholder involvement	.000	.
N	Potential Flexible Learning path	72	72
	Current Stakeholder involvement	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Stakeholder involvement[b]	.	Enter

a. Dependent Variable: Potential Flexible Learning path

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.424[a]	.180	.168	.76934	.180	15.336	1	70	.000

a. Predictors: (Constant), Current Stakeholder involvement

b. Dependent Variable: Potential Flexible Learning path

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.077	1	9.077	15.336	.000[b]
	Residual	41.432	70	.592		
	Total	50.510	71			

a. Dependent Variable: Potential Flexible Learning path

b. Predictors: (Constant), Current Stakeholder involvement

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.187	.217		10.066	.000	1.754	2.621
	Current Stakeholder involvement	.329	.084	.424	3.916	.000	.161	.496

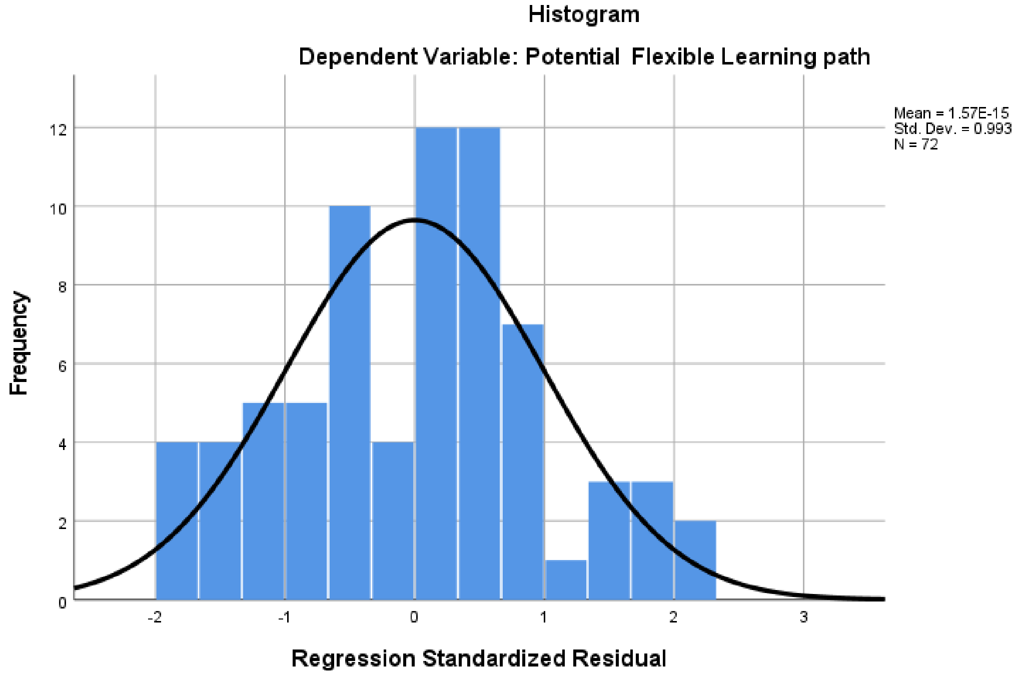
a. Dependent Variable: Potential Flexible Learning path

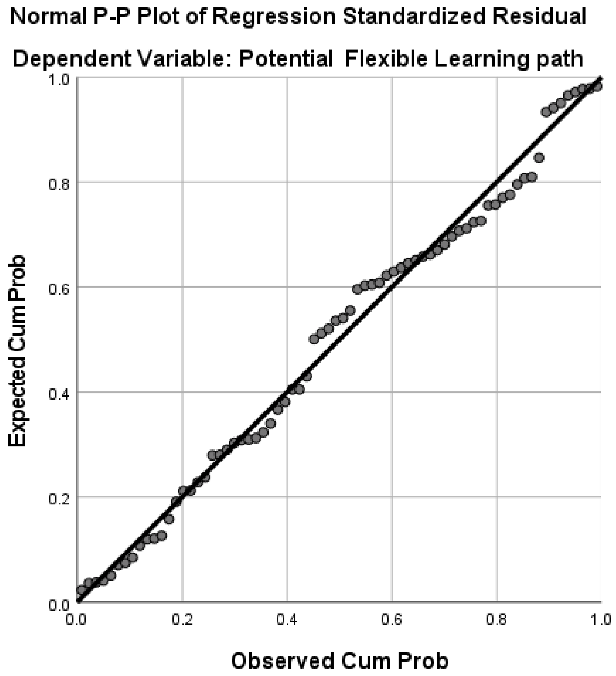
Residuals Statistics[a]

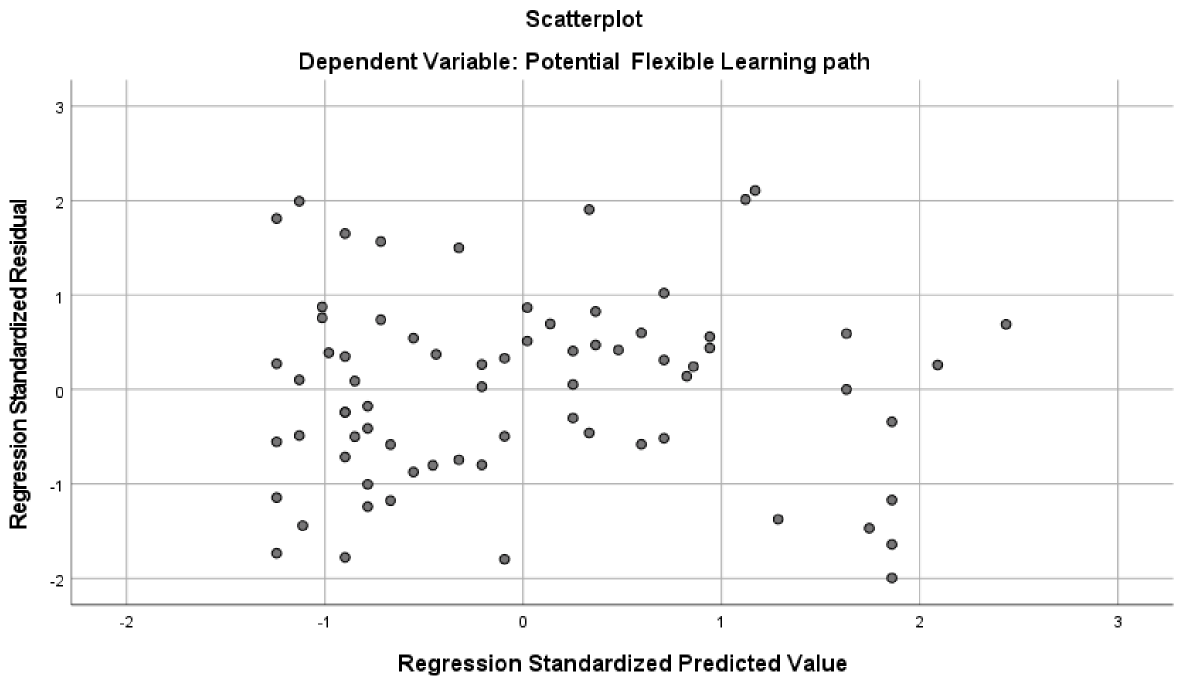
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.5163	3.8318	2.9609	.35756	72
Residual	-1.53535	1.62039	.00000	.76391	72
Std. Predicted Value	-1.243	2.436	.000	1.000	72
Std. Residual	-1.996	2.106	.000	.993	72

a. Dependent Variable: Potential Flexible Learning path

Charts


Histogram
Dependent Variable: Potential Flexible Learning path
Mean = 1.57E-15
Std. Dev. = 0.993
N = 72
Frequency
Regression Standardized Residual
0
2
4
6
8
10
12
-2
-1
0
1
2
3


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Flexible Learning path
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

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REGRESSION
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  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Real_World_Experience
  /METHOD=ENTER C_Stakeholder
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Real World Experience	3.4329	1.13932	72
Current Stakeholder involvement	2.3517	1.08725	72

Correlations

		Potential Real World Experience	Current Stakeholder involvement
Pearson Correlation	Potential Real World Experience	1.000	.430
	Current Stakeholder involvement	.430	1.000
Sig. (1-tailed)	Potential Real World Experience	.	.000
	Current Stakeholder involvement	.000	.
N	Potential Real World Experience	72	72
	Current Stakeholder involvement	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Stakeholder involvement[b]	.	Enter

a. Dependent Variable: Potential Real World Experience

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.430[a]	.185	.173	1.03588	.185	15.887	1	70	.000

a. Predictors: (Constant), Current Stakeholder involvement

b. Dependent Variable: Potential Real World Experience

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.048	1	17.048	15.887	.000[b]
	Residual	75.114	70	1.073		
	Total	92.162	71			

a. Dependent Variable: Potential Real World Experience

b. Predictors: (Constant), Current Stakeholder involvement

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.373	.293		8.110	.000	1.789	2.957
	Current Stakeholder involvement	.451	.113	.430	3.986	.000	.225	.676

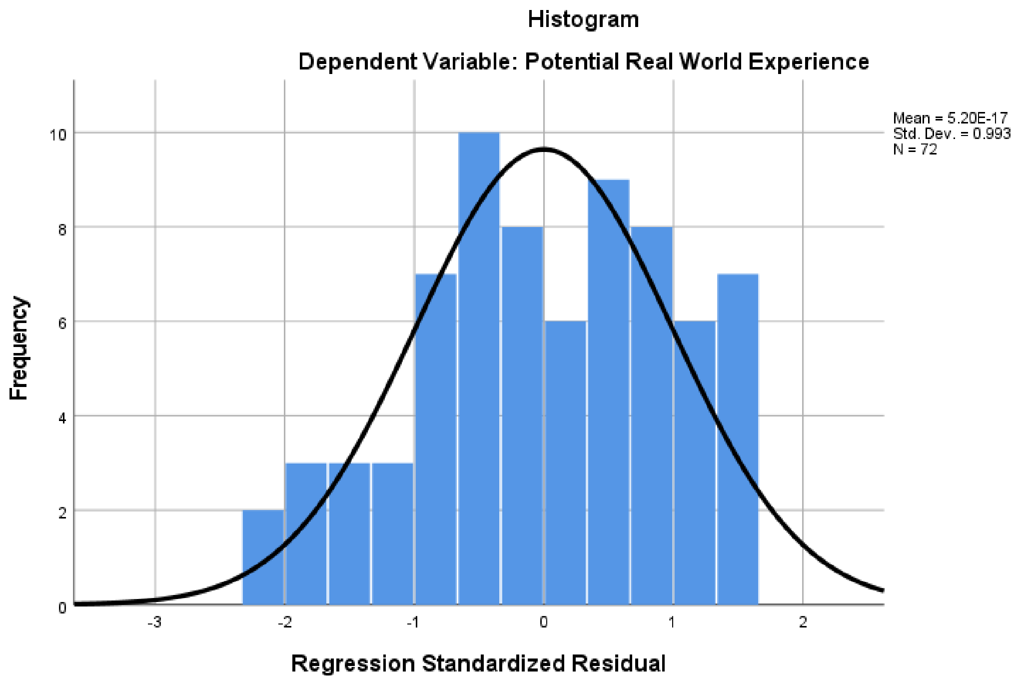
a. Dependent Variable: Potential Real World Experience

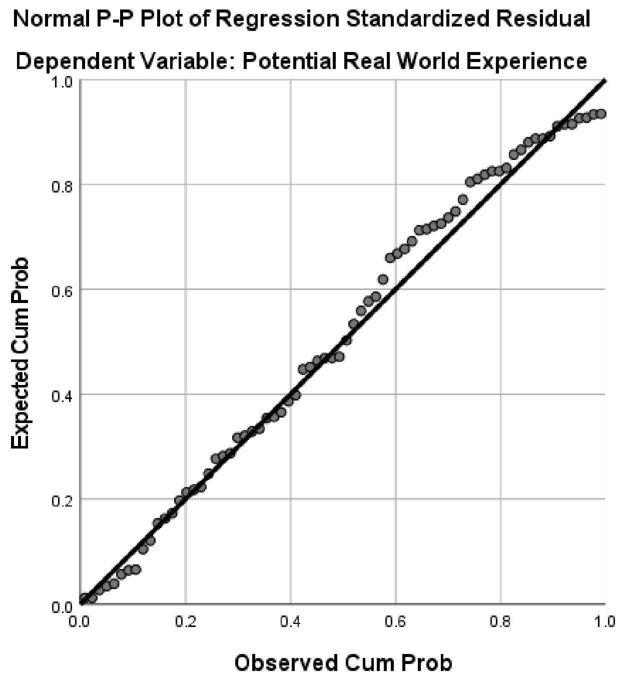
Residuals Statistics[a]

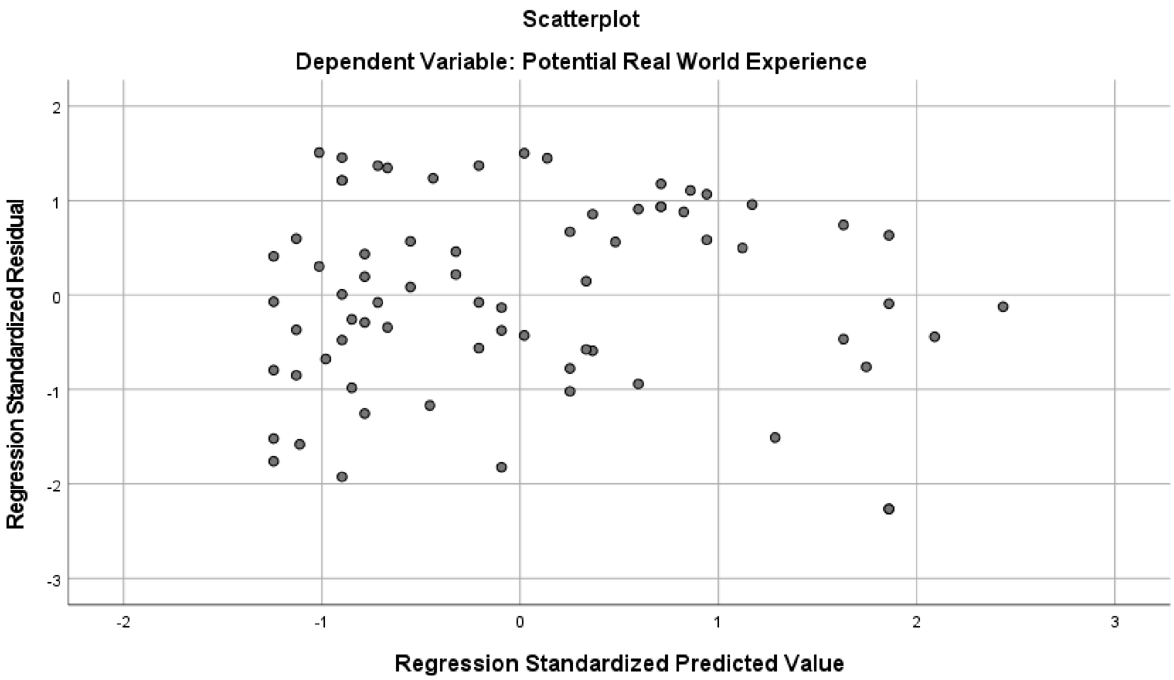
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.8237	4.6264	3.4329	.49001	72
Residual	-2.34476	1.56365	.00000	1.02856	72
Std. Predicted Value	-1.243	2.436	.000	1.000	72
Std. Residual	-2.264	1.509	.000	.993	72

a. Dependent Variable: Potential Real World Experience

Charts


Histogram
Dependent Variable: Potential Real World Experience
Mean = 5.20E-17
Std. Dev. = 0.993
N = 72
Frequency
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Real World Experience
Expected Cum Prob
Observed Cum Prob

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REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Enterprise_skills
  /METHOD=ENTER C_Stakeholder
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Enterprise_skills	3.5810	1.00857	72
Current Stakeholder involvement	2.3517	1.08725	72

Correlations

		Potential Enterprise_skills	Current Stakeholder involvement
Pearson Correlation	Potential Enterprise_skills	1.000	.243
	Current Stakeholder involvement	.243	1.000
Sig. (1-tailed)	Potential Enterprise_skills	.	.020
	Current Stakeholder involvement	.020	.
N	Potential Enterprise_skills	72	72
	Current Stakeholder involvement	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Stakeholder involvement[b]	.	Enter

a. Dependent Variable: Potential Enterprise_skills

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.243[a]	.059	.046	.98521	.059	4.407	1	70	.039

a. Predictors: (Constant), Current Stakeholder involvement

b. Dependent Variable: Potential Enterprise_skills

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.277	1	4.277	4.407	.039[b]
	Residual	67.945	70	.971		
	Total	72.222	71			

a. Dependent Variable: Potential Enterprise_skills

b. Predictors: (Constant), Current Stakeholder involvement

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound
1	(Constant)	3.050	.278		10.961	.000	2.495	3.605
	Current Stakeholder involvement	.226	.108	.243	2.099	.039	.011	.440

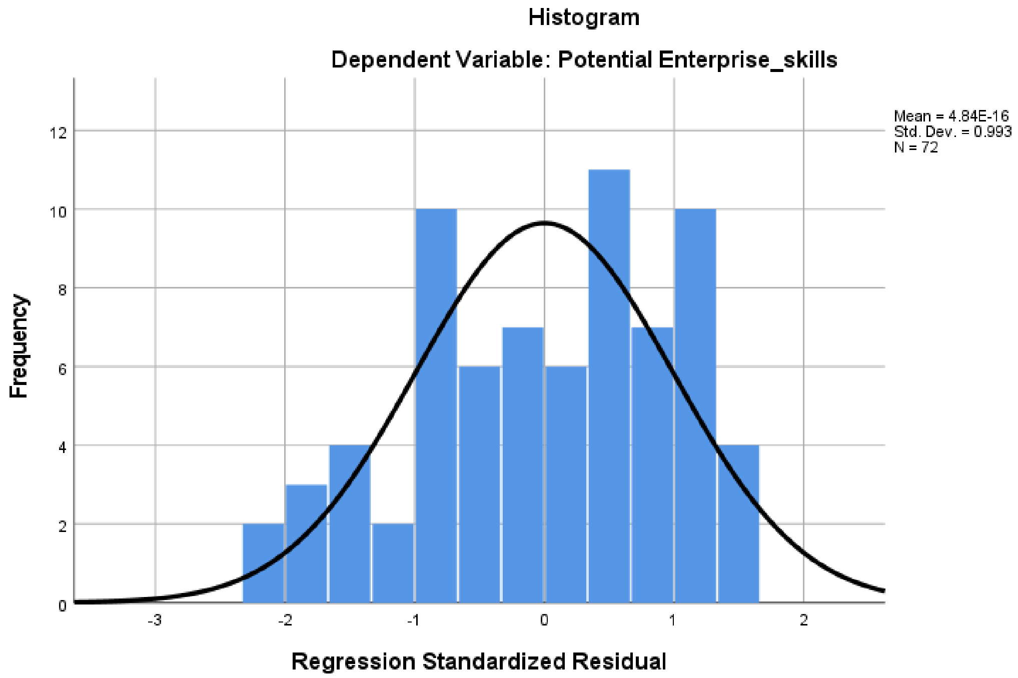
a. Dependent Variable: Potential Enterprise_skills

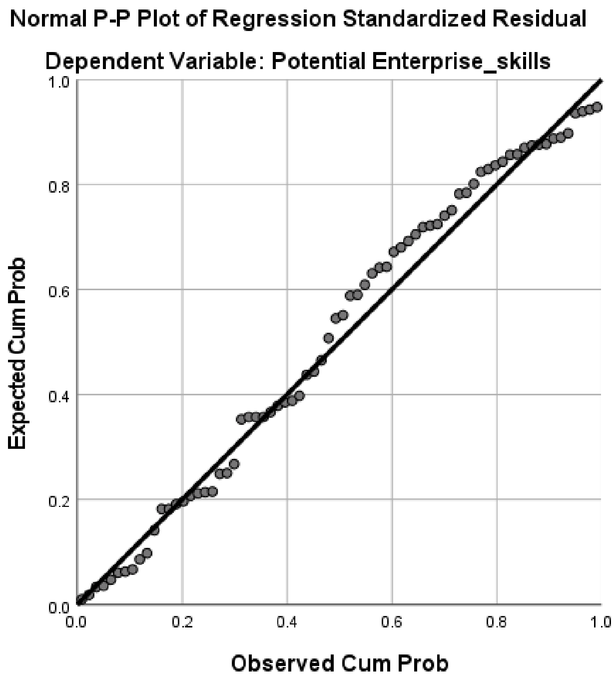
Residuals Statistics[a]

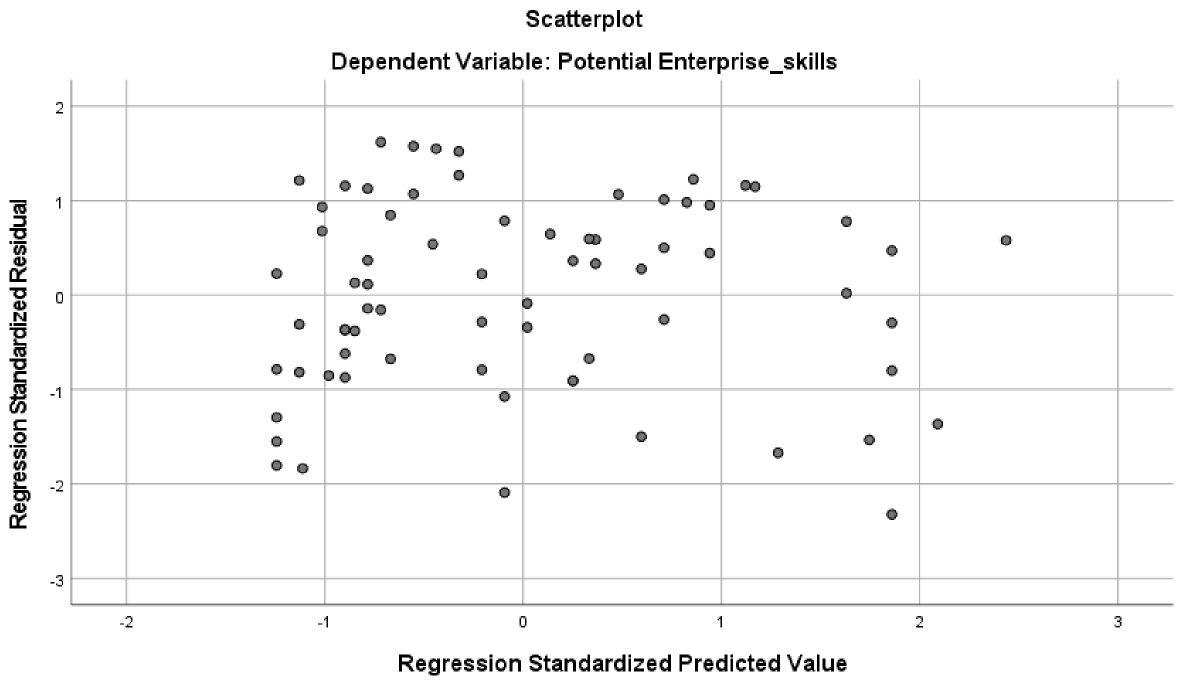
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3.2759	4.1789	3.5810	.24544	72
Residual	-2.28778	1.59512	.00000	.97825	72
Std. Predicted Value	-1.243	2.436	.000	1.000	72
Std. Residual	-2.322	1.619	.000	.993	72

a. Dependent Variable: Potential Enterprise_skills

Charts


Histogram
Dependent Variable: Potential Enterprise_skills
Mean = 4.84E-16
Std. Dev. = 0.993
N = 72
Frequency
0
2
4
6
8
10
12
-3
-2
-1
0
1
2
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Enterprise_skills
Expected Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0
0.0
0.2
0.4
0.6
0.8
1.0
Observed Cum Prob




```
REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Teacher_Role
  /METHOD=ENTER C_Stakeholder
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Teacher role	3.3627	.84187	72
Current Stakeholder involvement	2.3517	1.08725	72

Correlations

		Potential Teacher role	Current Stakeholder involvement
Pearson Correlation	Potential Teacher role	1.000	.380
	Current Stakeholder involvement	.380	1.000
Sig. (1-tailed)	Potential Teacher role	.	.000
	Current Stakeholder involvement	.000	.
N	Potential Teacher role	72	72
	Current Stakeholder involvement	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method

1	Current Stakeholder involvement[b]	.	Enter

a. Dependent Variable: Potential Teacher role

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.380[a]	.145	.132	.78418	.145	11.830	1	70	.001

a. Predictors: (Constant), Current Stakeholder involvement

b. Dependent Variable: Potential Teacher role

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.275	1	7.275	11.830	.001[b]
	Residual	43.046	70	.615		
	Total	50.321	71			

a. Dependent Variable: Potential Teacher role

b. Predictors: (Constant), Current Stakeholder involvement

Coefficients[a]

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B

		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.670	.221		12.056	.000	2.229	3.112
	Current Stakeholder involvement	.294	.086	.380	3.440	.001	.124	.465

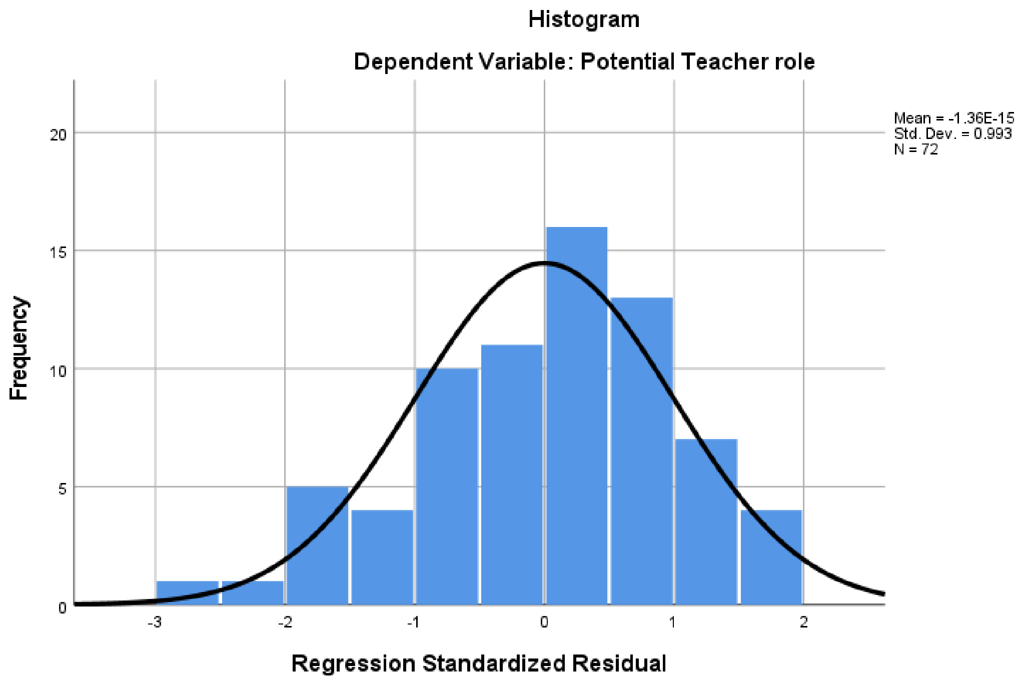
a. Dependent Variable: Potential Teacher role

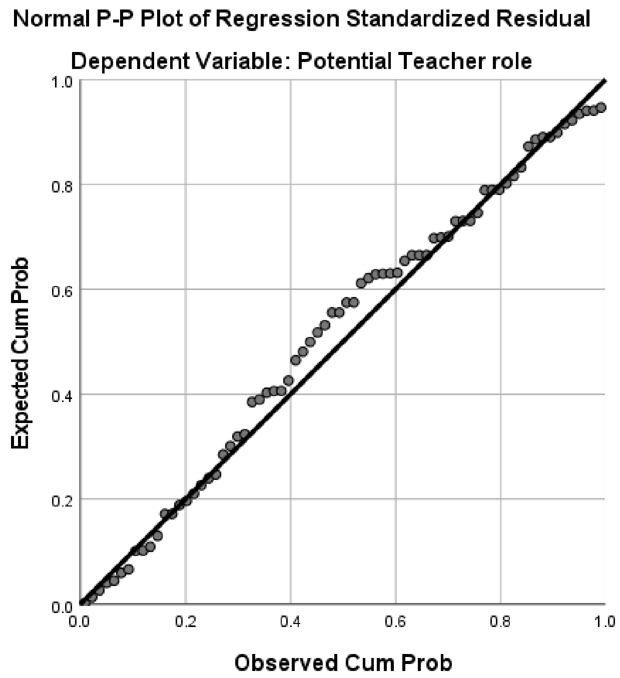
Residuals Statistics[a]

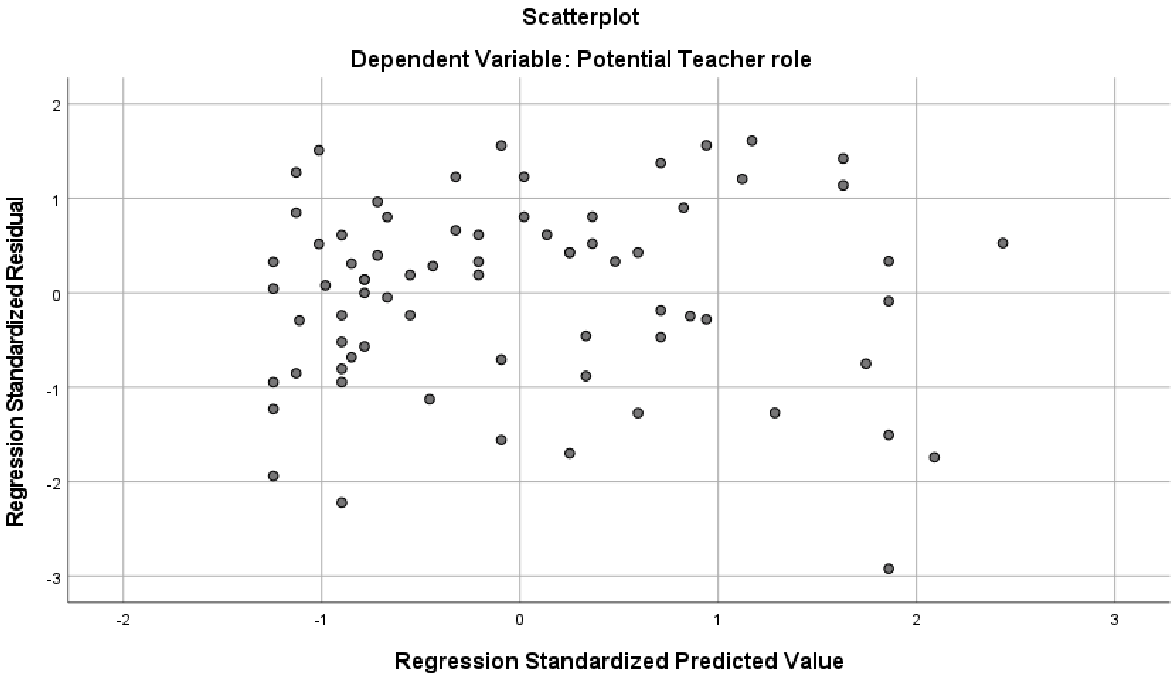
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.9647	4.1424	3.3627	.32010	72
Residual	-2.29168	1.26247	.00000	.77864	72
Std. Predicted Value	-1.243	2.436	.000	1.000	72
Std. Residual	-2.922	1.610	.000	.993	72

a. Dependent Variable: Potential Teacher role

Charts


Histogram
Dependent Variable: Potential Teacher role
Mean = -1.36E-15
Std. Dev. = 0.993
N = 72
Frequency
20
15
10
5
0
-3
-2
-1
0
1
2
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Teacher role
Expected Cum Prob
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Observed Cum Prob

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REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Stakeholder
  /METHOD=ENTER C_Flexible_learning_path
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Stakeholder involvement	2.9613	1.05580	72
Current Flexible learning path	2.3191	.77210	72

Correlations

		Potential Stakeholder involvement	Current Flexible learning path
Pearson Correlation	Potential Stakeholder involvement	1.000	.519
	Current Flexible learning path	.519	1.000
Sig. (1-tailed)	Potential Stakeholder involvement	.	.000
	Current Flexible learning path	.000	.
N	Potential Stakeholder involvement	72	72
	Current Flexible learning path	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Flexible learning path[b]	.	Enter

a. Dependent Variable: Potential Stakeholder involvement

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.519[a]	.269	.259	.90907	.269	25.771	1	70	.000

a. Predictors: (Constant), Current Flexible learning path

b. Dependent Variable: Potential Stakeholder involvement

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.297	1	21.297	25.771	.000[b]
	Residual	57.848	70	.826		
	Total	79.145	71			

a. Dependent Variable: Potential Stakeholder involvement

b. Predictors: (Constant), Current Flexible learning path

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.316	.341		3.857	.000	.636	1.997
	Current Flexible learning path	.709	.140	.519	5.077	.000	.431	.988

a. Dependent Variable: Potential Stakeholder involvement

Residuals Statistics[a]

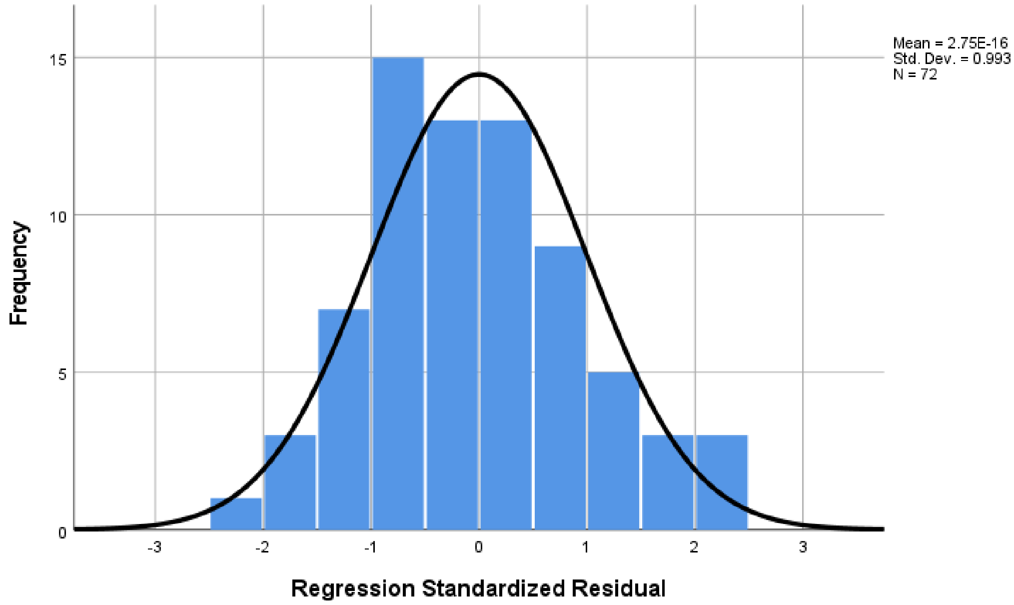
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.0256	4.2182	2.9613	.54769	72
Residual	-2.00882	2.20451	.00000	.90264	72
Std. Predicted Value	-1.708	2.295	.000	1.000	72
Std. Residual	-2.210	2.425	.000	.993	72

a. Dependent Variable: Potential Stakeholder involvement

Charts

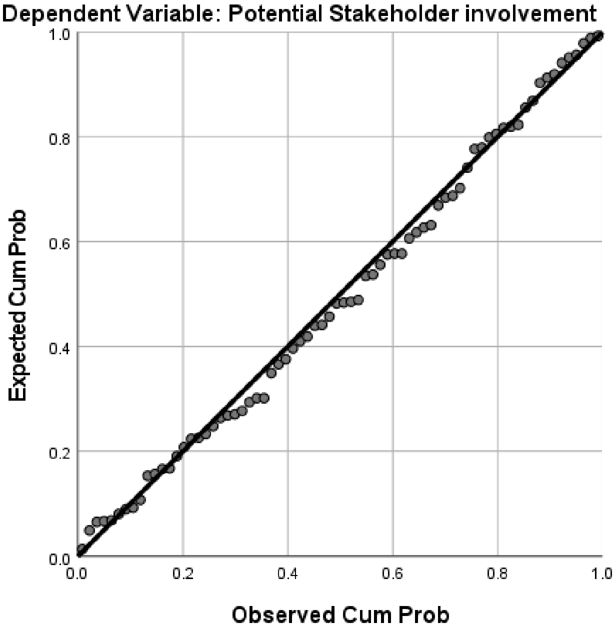
Histogram

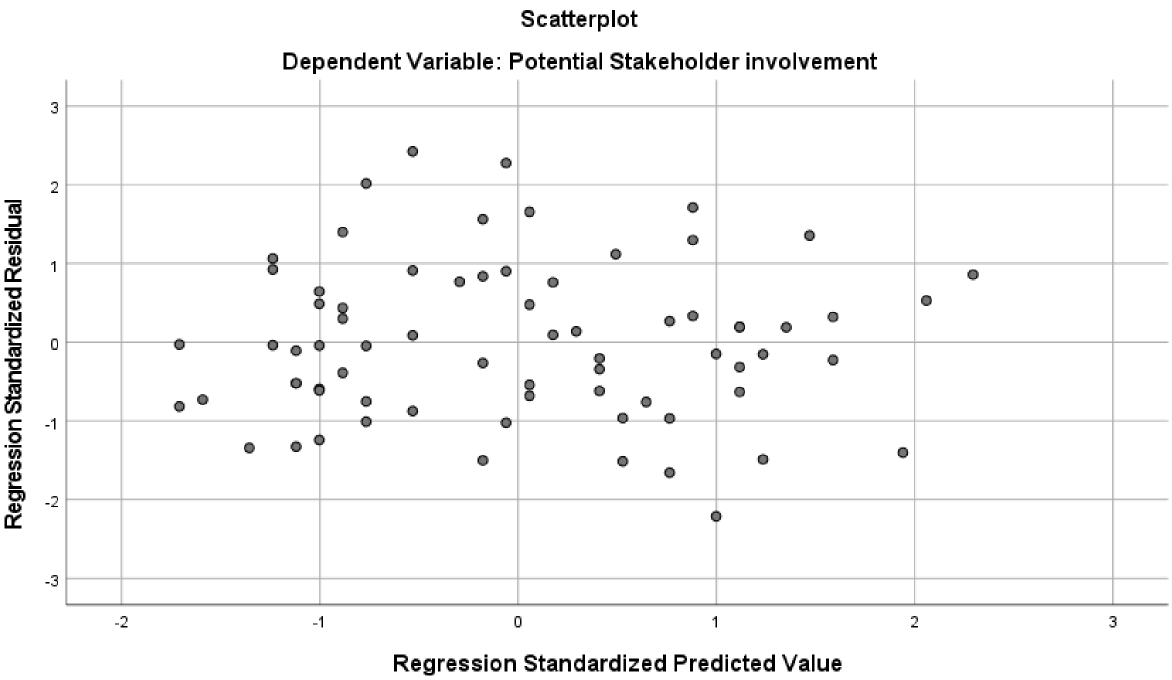
Dependent Variable: Potential Stakeholder involvement



Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Potential Stakeholder involvement



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REGRESSION
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  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Real_World_Experience
  /METHOD=ENTER C_Flexible_learning_path
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Real World Experience	3.4329	1.13932	72
Current Flexible learning path	2.3191	.77210	72

Correlations

		Potential Real World Experience	Current Flexible learning path
Pearson Correlation	Potential Real World Experience	1.000	.386
	Current Flexible learning path	.386	1.000
Sig. (1-tailed)	Potential Real World Experience	.	.000
	Current Flexible learning path	.000	.
N	Potential Real World Experience	72	72
	Current Flexible learning path	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Flexible learning path[b]	.	Enter

a. Dependent Variable: Potential Real World Experience

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.386[a]	.149	.137	1.05834	.149	12.281	1	70	.001

a. Predictors: (Constant), Current Flexible learning path

b. Dependent Variable: Potential Real World Experience

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.756	1	13.756	12.281	.001[b]
	Residual	78.406	70	1.120		
	Total	92.162	71			

a. Dependent Variable: Potential Real World Experience

b. Predictors: (Constant), Current Flexible learning path

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.111	.397		5.312	.000	1.318	2.903
	Current Flexible learning path	.570	.163	.386	3.504	.001	.246	.895

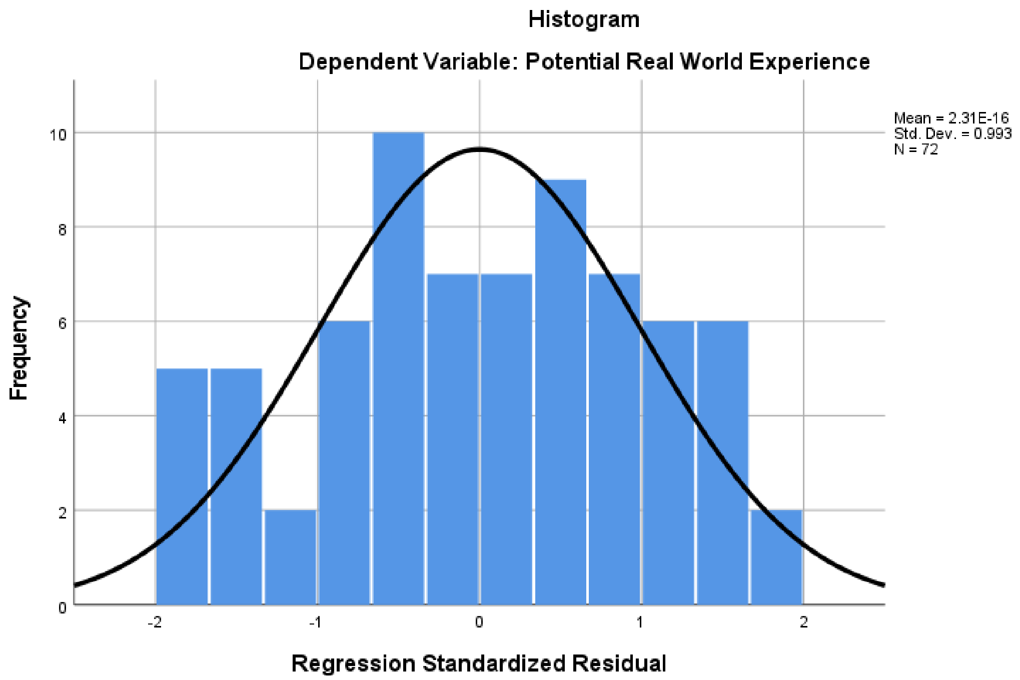
a. Dependent Variable: Potential Real World Experience

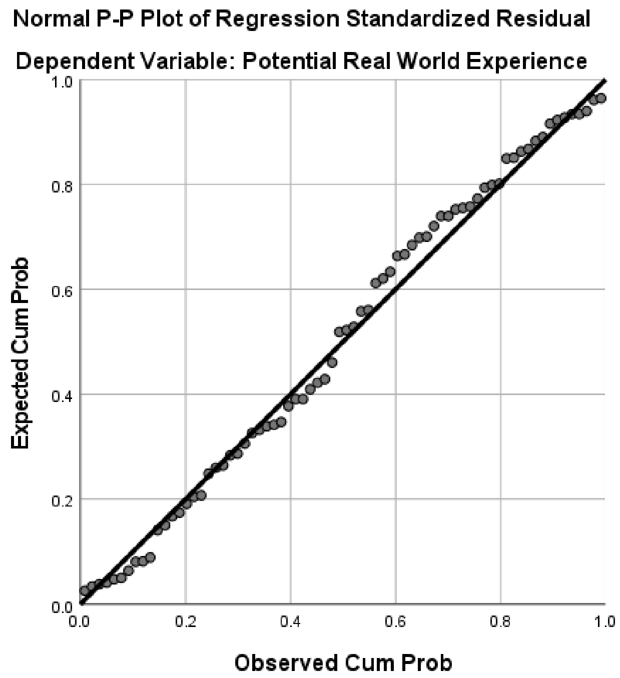
Residuals Statistics[a]

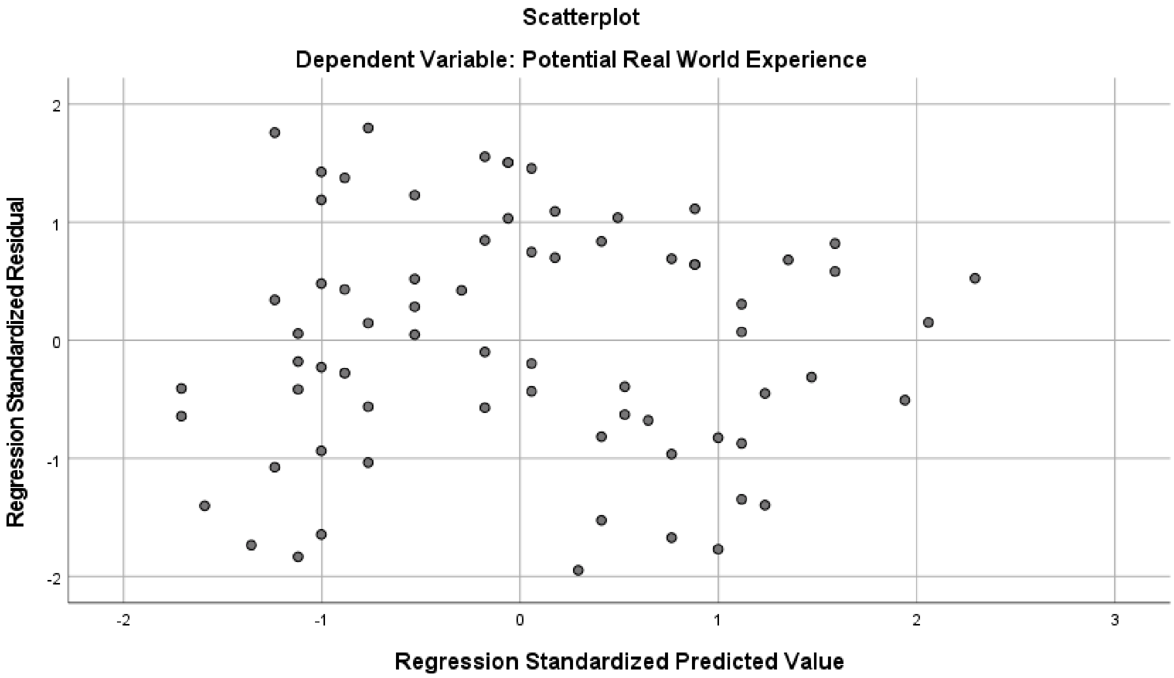
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.6809	4.4430	3.4329	.44016	72
Residual	-2.06193	1.90450	.00000	1.05086	72
Std. Predicted Value	-1.708	2.295	.000	1.000	72
Std. Residual	-1.948	1.800	.000	.993	72

a. Dependent Variable: Potential Real World Experience

Charts


Histogram
Dependent Variable: Potential Real World Experience
Mean = 2.31E-16
Std. Dev. = 0.993
N = 72
Frequency
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Real World Experience
Expected Cum Prob
Observed Cum Prob

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REGRESSION
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  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Enterprise_skills
  /METHOD=ENTER C_Flexible_learning_path
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Enterprise_skills	3.5810	1.00857	72
Current Flexible learning path	2.3191	.77210	72

Correlations

		Potential Enterprise_skills	Current Flexible learning path
Pearson Correlation	Potential Enterprise_skills	1.000	.307
	Current Flexible learning path	.307	1.000
Sig. (1-tailed)	Potential Enterprise_skills	.	.004
	Current Flexible learning path	.004	.
N	Potential Enterprise_skills	72	72
	Current Flexible learning path	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Flexible learning path[b]	.	Enter

a. Dependent Variable: Potential Enterprise_skills

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.307[a]	.094	.081	.96670	.094	7.283	1	70	.009

a. Predictors: (Constant), Current Flexible learning path

b. Dependent Variable: Potential Enterprise_skills

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.806	1	6.806	7.283	.009[b]
	Residual	65.416	70	.935		
	Total	72.222	71			

a. Dependent Variable: Potential Enterprise_skills

b. Predictors: (Constant), Current Flexible learning path

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound
1	(Constant)	2.651	.363		7.305	.000	1.927	3.375
	Current Flexible learning path	.401	.149	.307	2.699	.009	.105	.697

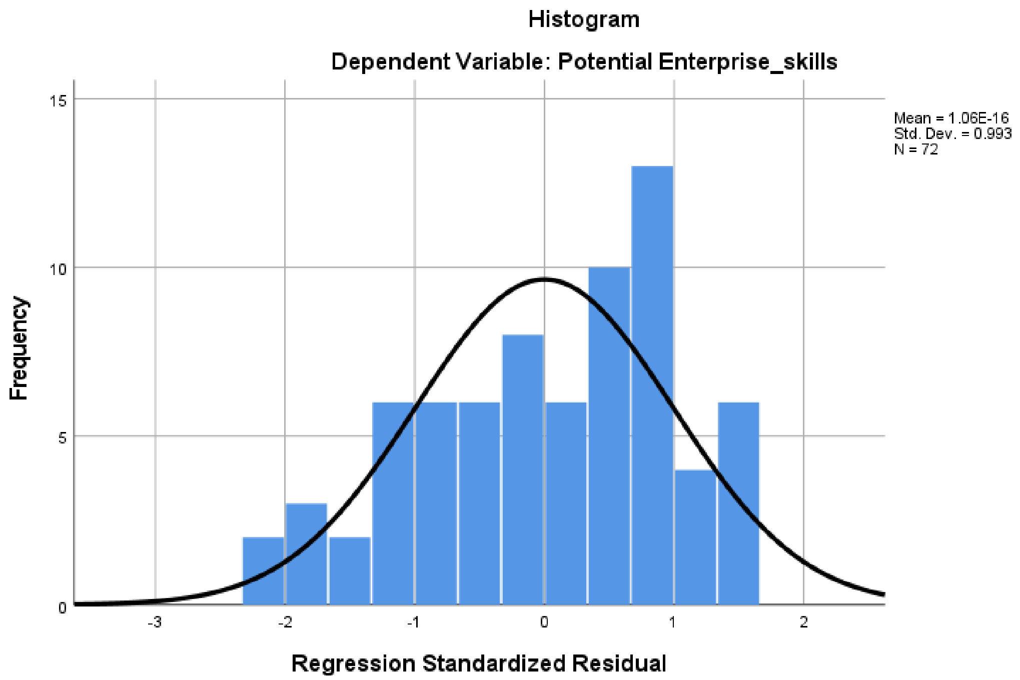
a. Dependent Variable: Potential Enterprise_skills

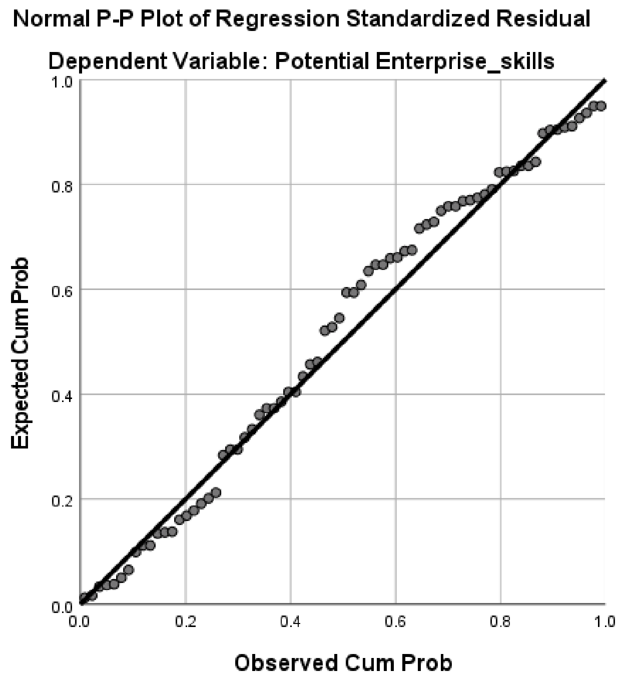
Residuals Statistics[a]

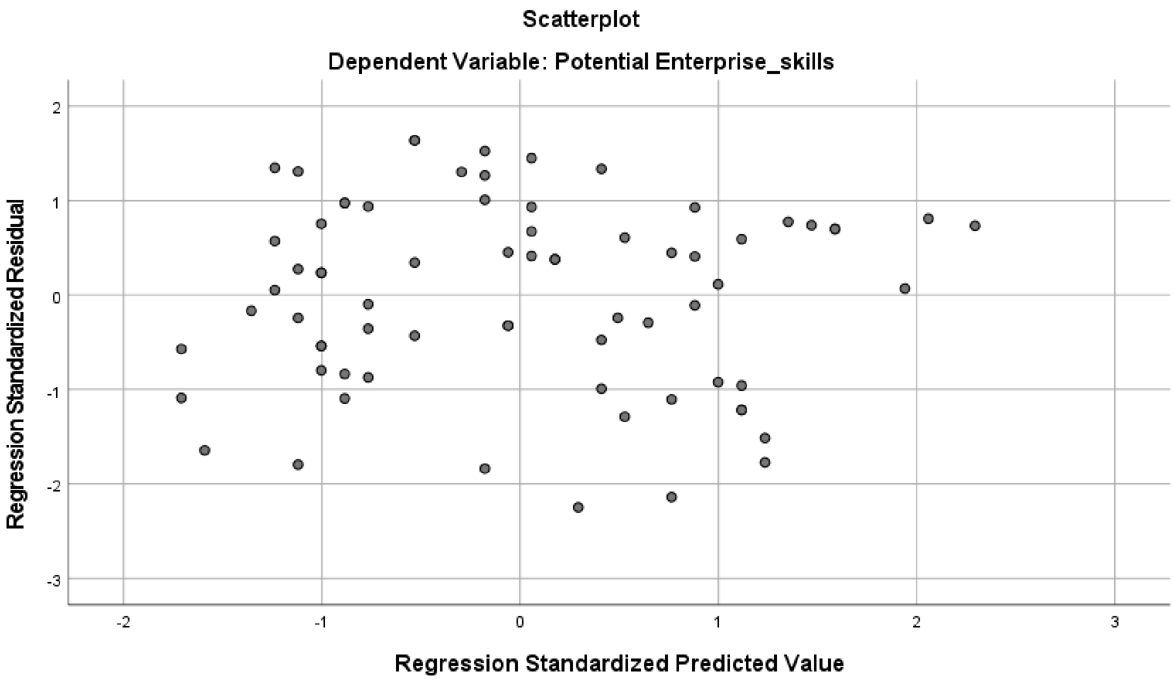
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3.0521	4.2915	3.5810	.30960	72
Residual	-2.17180	1.58338	.00000	.95987	72
Std. Predicted Value	-1.708	2.295	.000	1.000	72
Std. Residual	-2.247	1.638	.000	.993	72

a. Dependent Variable: Potential Enterprise_skills

Charts


Histogram
Dependent Variable: Potential Enterprise_skills
Mean = 1.06E-16
Std. Dev. = 0.993
N = 72
Frequency
Regression Standardized Residual
15
10
5
0
-3
-2
-1
0
1
2


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Enterprise_skills
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0




```
REGRESSION
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  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Teacher_Role
  /METHOD=ENTER C_Flexible_learning_path
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Teacher role	3.3627	.84187	72
Current Flexible learning path	2.3191	.77210	72

Correlations

		Potential Teacher role	Current Flexible learning path
Pearson Correlation	Potential Teacher role	1.000	.422
	Current Flexible learning path	.422	1.000
Sig. (1-tailed)	Potential Teacher role	.	.000
	Current Flexible learning path	.000	.
N	Potential Teacher role	72	72
	Current Flexible learning path	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method

1	Current Flexible learning path[b]	.	Enter

a. Dependent Variable: Potential Teacher role

b. All requested variables entered.

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.422[a]	.178	.167	.76850	.178	15.204	1	70	.000

a. Predictors: (Constant), Current Flexible learning path

b. Dependent Variable: Potential Teacher role

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.979	1	8.979	15.204	.000[b]
	Residual	41.341	70	.591		
	Total	50.321	71			

a. Dependent Variable: Potential Teacher role

b. Predictors: (Constant), Current Flexible learning path

Coefficients[a]

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B

		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.294	.289		7.953	.000	1.719	2.870
	Current Flexible learning path	.461	.118	.422	3.899	.000	.225	.696

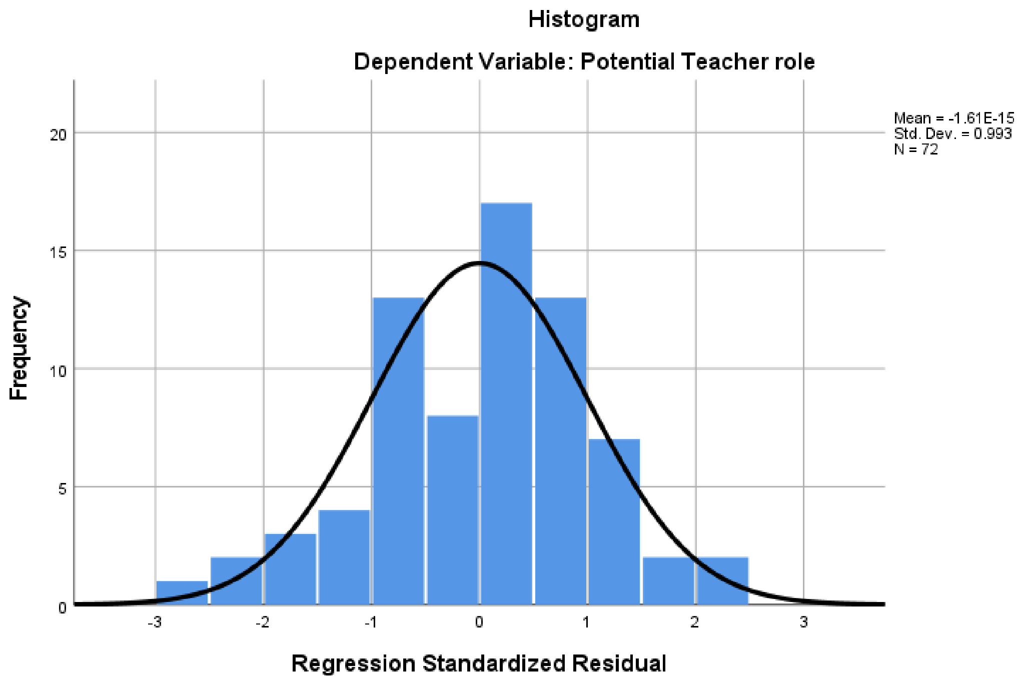
a. Dependent Variable: Potential Teacher role

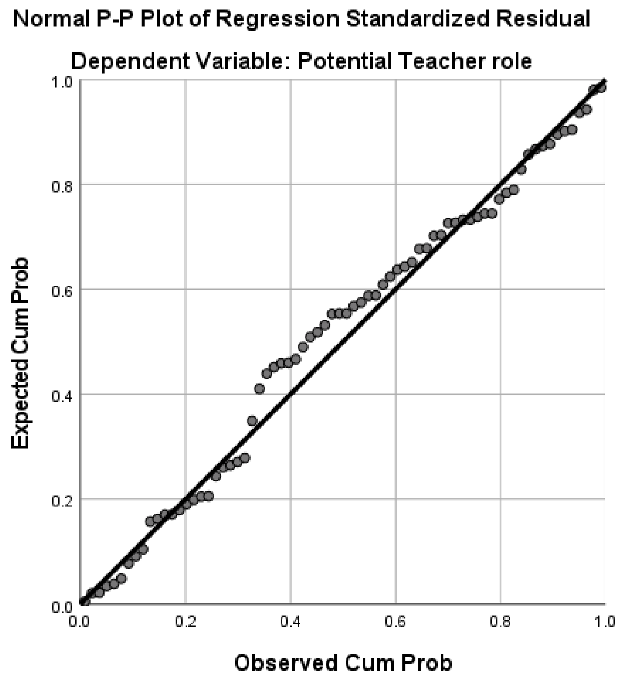
Residuals Statistics[a]

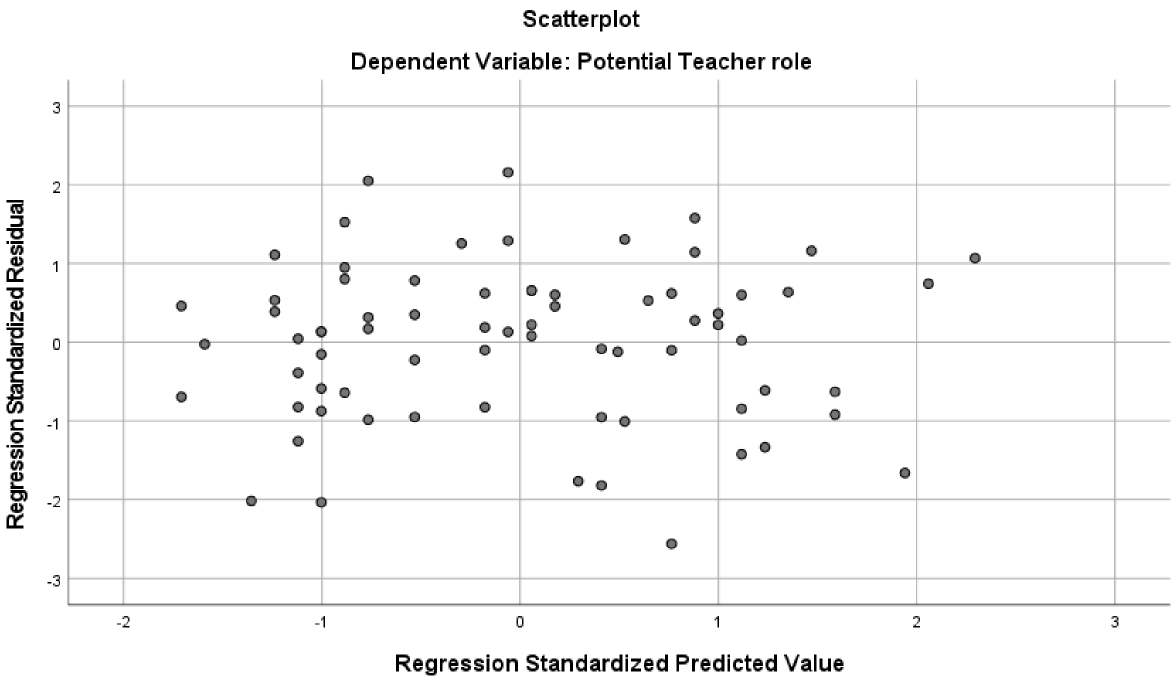
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.7551	4.1788	3.3627	.35563	72
Residual	-1.96775	1.65869	.00000	.76307	72
Std. Predicted Value	-1.708	2.295	.000	1.000	72
Std. Residual	-2.561	2.158	.000	.993	72

a. Dependent Variable: Potential Teacher role

Charts


Histogram
Dependent Variable: Potential Teacher role
Mean = -1.61E-15
Std. Dev. = 0.993
N = 72
Frequency
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Teacher role
Expected Cum Prob
Observed Cum Prob

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REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Stakeholder
  /METHOD=ENTER C_Real_world_experience
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Stakeholder involvement	2.9613	1.05580	72
Current Real world experience	2.9306	1.07568	72

Correlations

		Potential Stakeholder involvement	Current Real world experience
Pearson Correlation	Potential Stakeholder involvement	1.000	.518
	Current Real world experience	.518	1.000
Sig. (1-tailed)	Potential Stakeholder involvement	.	.000
	Current Real world experience	.000	.
N	Potential Stakeholder involvement	72	72
	Current Real world experience	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Real world experience[b]	.	Enter

a. Dependent Variable: Potential Stakeholder involvement

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.518[a]	.268	.257	.90978	.268	25.621	1	70	.000

a. Predictors: (Constant), Current Real world experience

b. Dependent Variable: Potential Stakeholder involvement

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.207	1	21.207	25.621	.000[b]
	Residual	57.939	70	.828		
	Total	79.145	71			

a. Dependent Variable: Potential Stakeholder involvement

b. Predictors: (Constant), Current Real world experience

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound
1	(Constant)	1.472	.313		4.703	.000	.848	2.097
	Current Real world experience	.508	.100	.518	5.062	.000	.308	.708

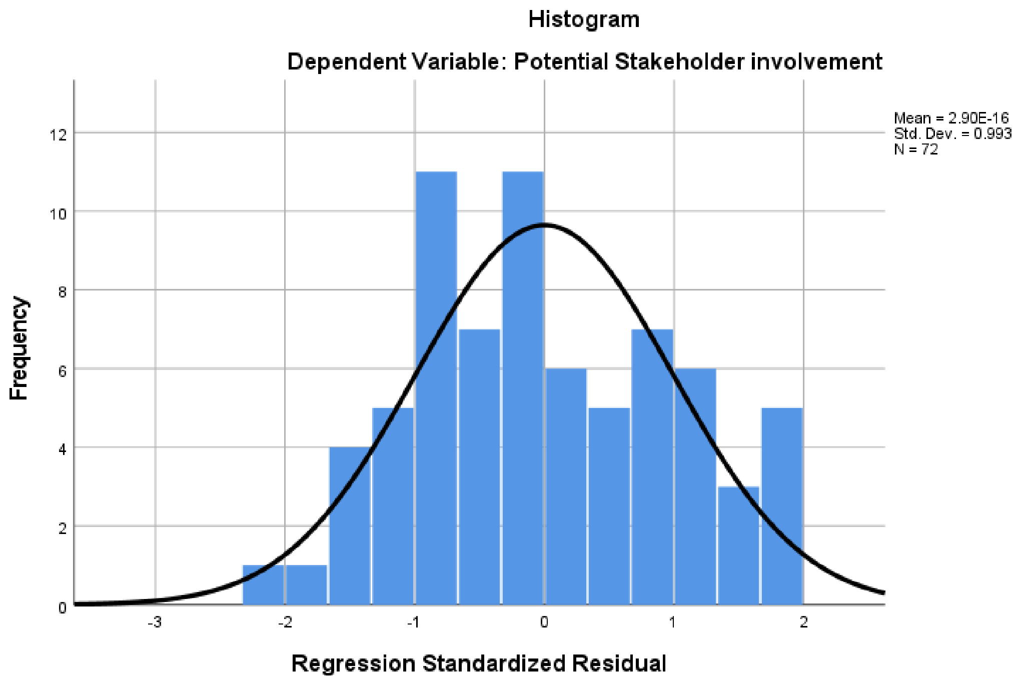
a. Dependent Variable: Potential Stakeholder involvement

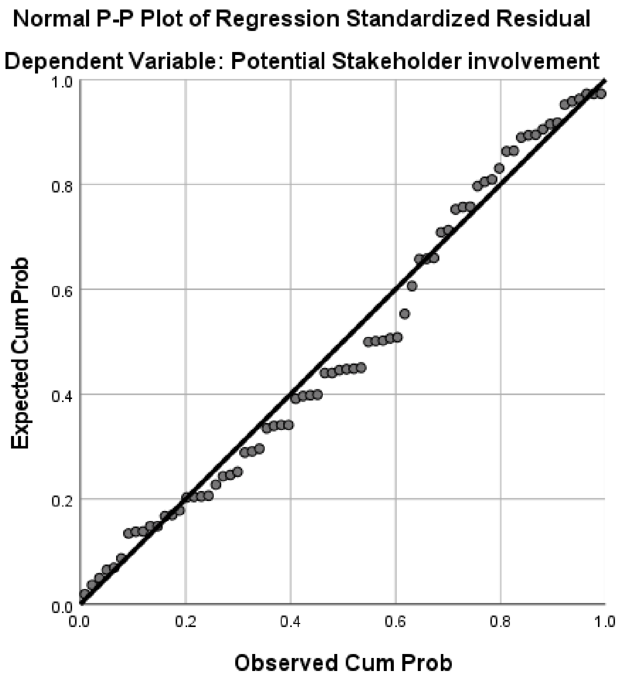
Residuals Statistics[a]

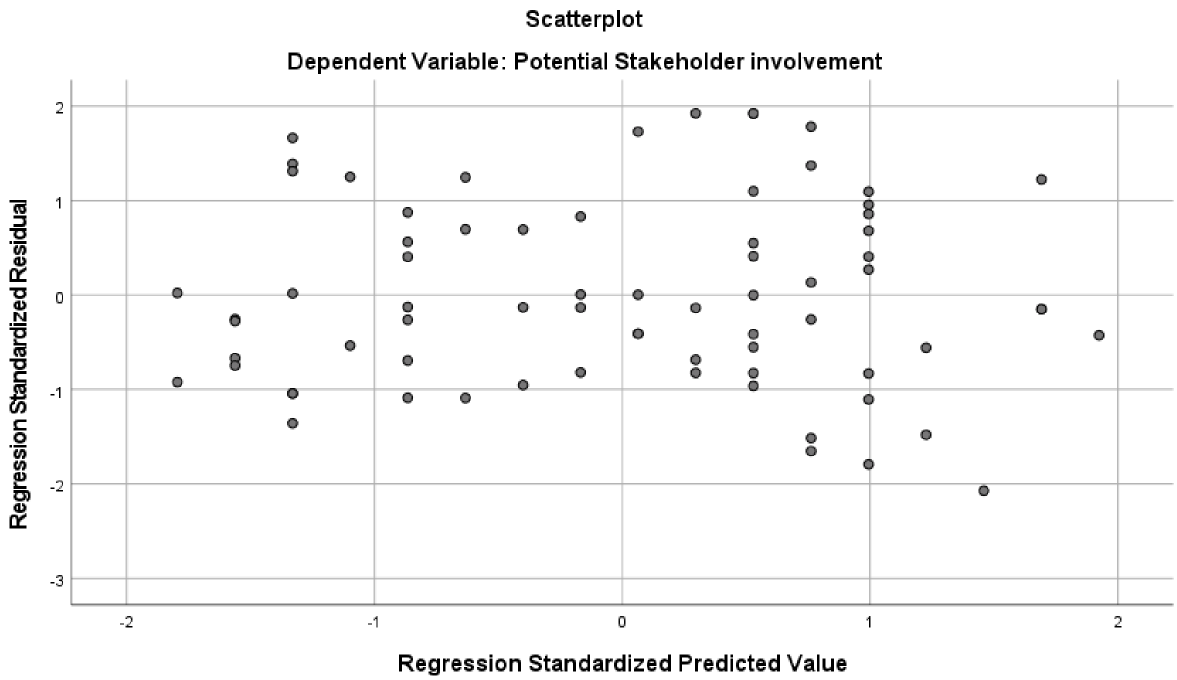
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.9804	4.0127	2.9613	.54652	72
Residual	-1.88370	1.75139	.00000	.90335	72
Std. Predicted Value	-1.795	1.924	.000	1.000	72
Std. Residual	-2.071	1.925	.000	.993	72

a. Dependent Variable: Potential Stakeholder involvement

Charts


Histogram
Dependent Variable: Potential Stakeholder involvement
Mean = 2.90E-16
Std. Dev. = 0.993
N = 72
Frequency
12
10
8
6
4
2
0
-3
-2
-1
0
1
2
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Stakeholder involvement
Expected Cum Prob
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Observed Cum Prob



REGRESSION

/DESCRIPTIVES MEAN STDDEV CORR SIG N

/MISSING LISTWISE

/STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT P_Flexible_Learning_Path

/METHOD=ENTER C_Real_world_experience

/SCATTERPLOT=(*ZRESID ,*ZPRED)

/RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Flexible Learning path	2.9609	.84345	72
Current Real world experience	2.9306	1.07568	72

Correlations

		Potential Flexible Learning path	Current Real world experience
Pearson Correlation	Potential Flexible Learning path	1.000	.319
	Current Real world experience	.319	1.000
Sig. (1-tailed)	Potential Flexible Learning path	.	.003
	Current Real world experience	.003	.
N	Potential Flexible Learning path	72	72
	Current Real world experience	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Real world experience[b]	.	Enter

a. Dependent Variable: Potential Flexible Learning path

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.319[a]	.102	.089	.80494	.102	7.954	1	70	.006

a. Predictors: (Constant), Current Real world experience

b. Dependent Variable: Potential Flexible Learning path

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.154	1	5.154	7.954	.006[b]
	Residual	45.356	70	.648		
	Total	50.510	71			

a. Dependent Variable: Potential Flexible Learning path

b. Predictors: (Constant), Current Real world experience

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound
1	(Constant)	2.227	.277		8.039	.000	1.674	2.779
	Current Real world experience	.250	.089	.319	2.820	.006	.073	.428

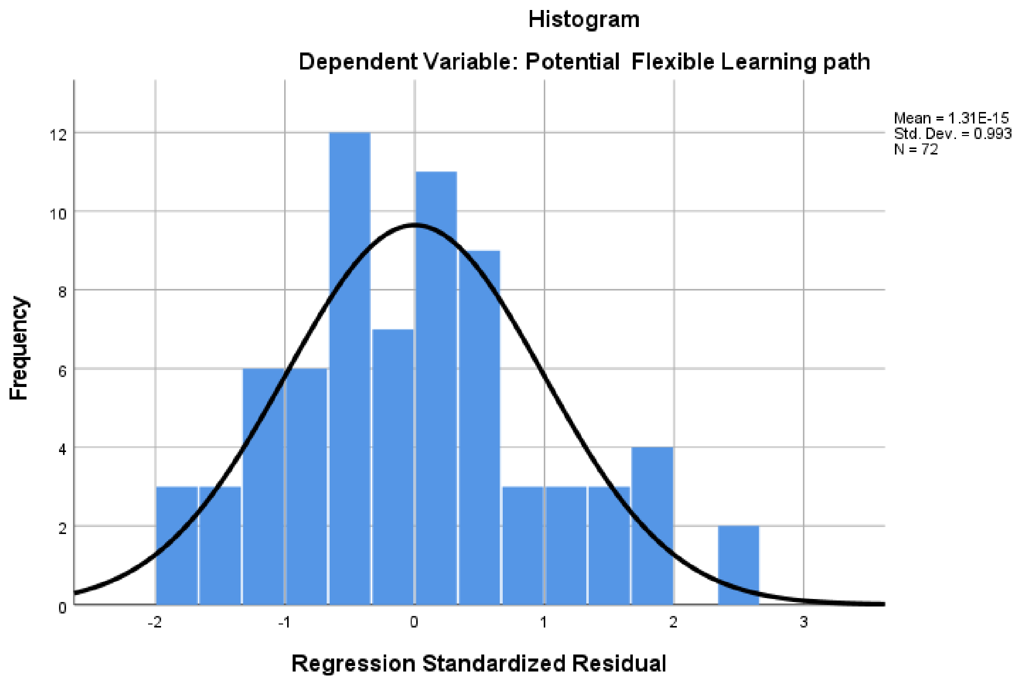
a. Dependent Variable: Potential Flexible Learning path

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.4773	3.4792	2.9609	.26943	72
Residual	-1.55803	1.93084	.00000	.79926	72
Std. Predicted Value	-1.795	1.924	.000	1.000	72
Std. Residual	-1.936	2.399	.000	.993	72

a. Dependent Variable: Potential Flexible Learning path

Charts


Histogram
Dependent Variable: Potential Flexible Learning path
Mean = 1.31E-15
Std. Dev. = 0.993
N = 72
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8
6
4
2
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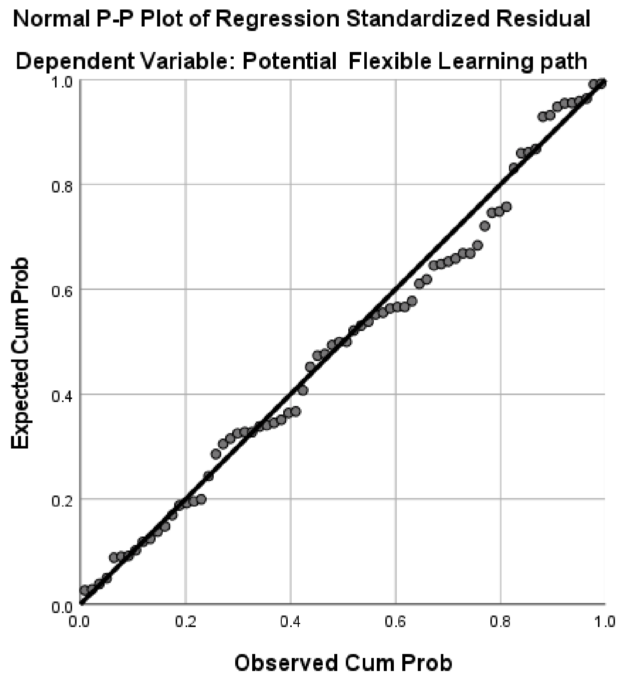
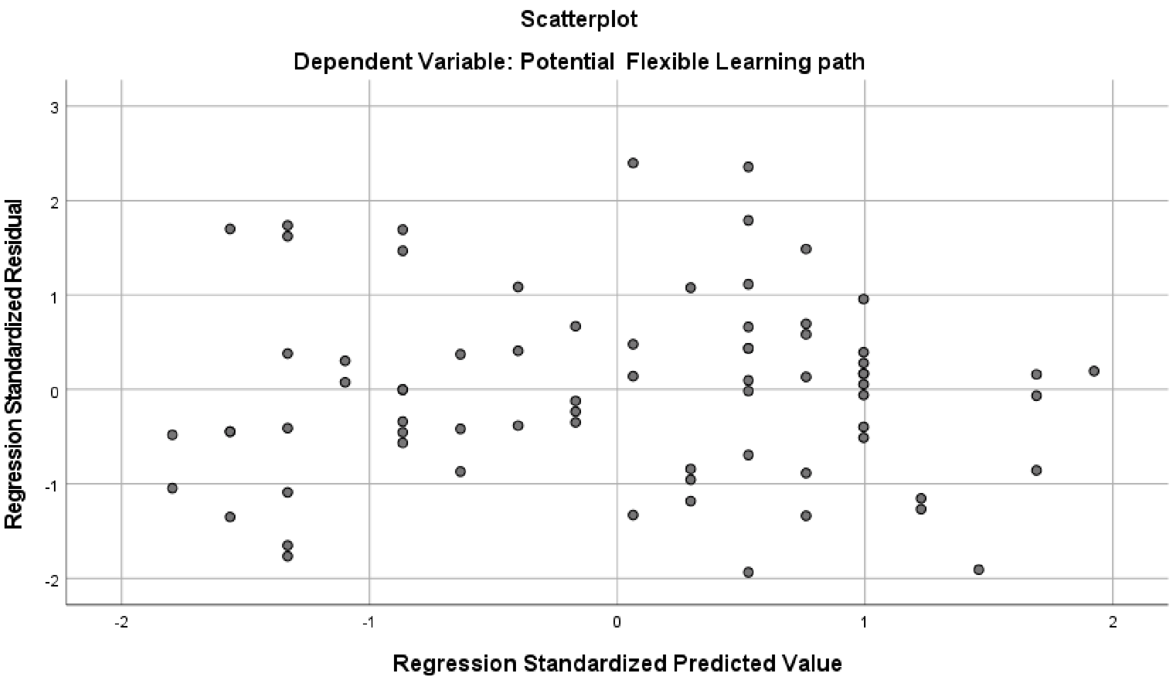
-2
-1
0
1
2
3
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Flexible Learning path
Expected Cum Prob
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Observed Cum Prob

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REGRESSION
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  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
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  /NOORIGIN
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  /METHOD=ENTER C_Real_world_experience
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
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Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Enterprise_skills	3.5810	1.00857	72
Current Real world experience	2.9306	1.07568	72

Correlations

		Potential Enterprise_skills	Current Real world experience
Pearson Correlation	Potential Enterprise_skills	1.000	.277
	Current Real world experience	.277	1.000
Sig. (1-tailed)	Potential Enterprise_skills	.	.009
	Current Real world experience	.009	.
N	Potential Enterprise_skills	72	72
	Current Real world experience	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Real world experience[b]	.	Enter

a. Dependent Variable: Potential Enterprise_skills

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.277[a]	.076	.063	.97614	.076	5.796	1	70	.019

a. Predictors: (Constant), Current Real world experience

b. Dependent Variable: Potential Enterprise_skills

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.523	1	5.523	5.796	.019[b]
	Residual	66.699	70	.953		
	Total	72.222	71			

a. Dependent Variable: Potential Enterprise_skills

b. Predictors: (Constant), Current Real world experience

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound
1	(Constant)	2.821	.336		8.398	.000	2.151	3.491
	Current Real world experience	.259	.108	.277	2.408	.019	.044	.474

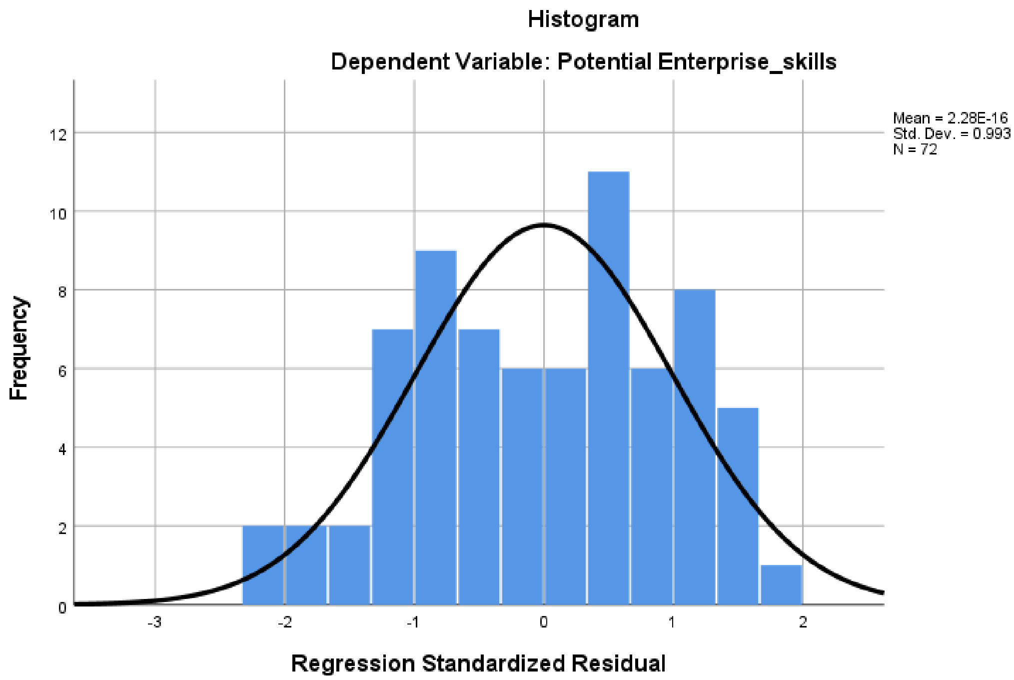
a. Dependent Variable: Potential Enterprise_skills

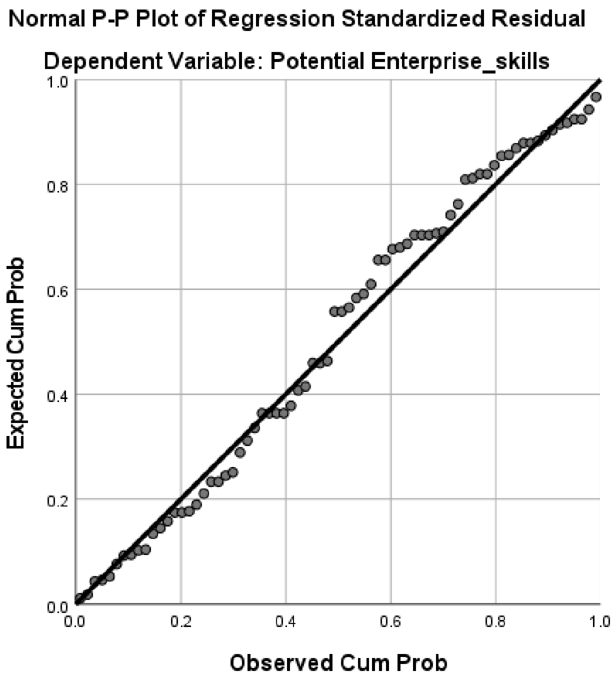
Residuals Statistics[a]

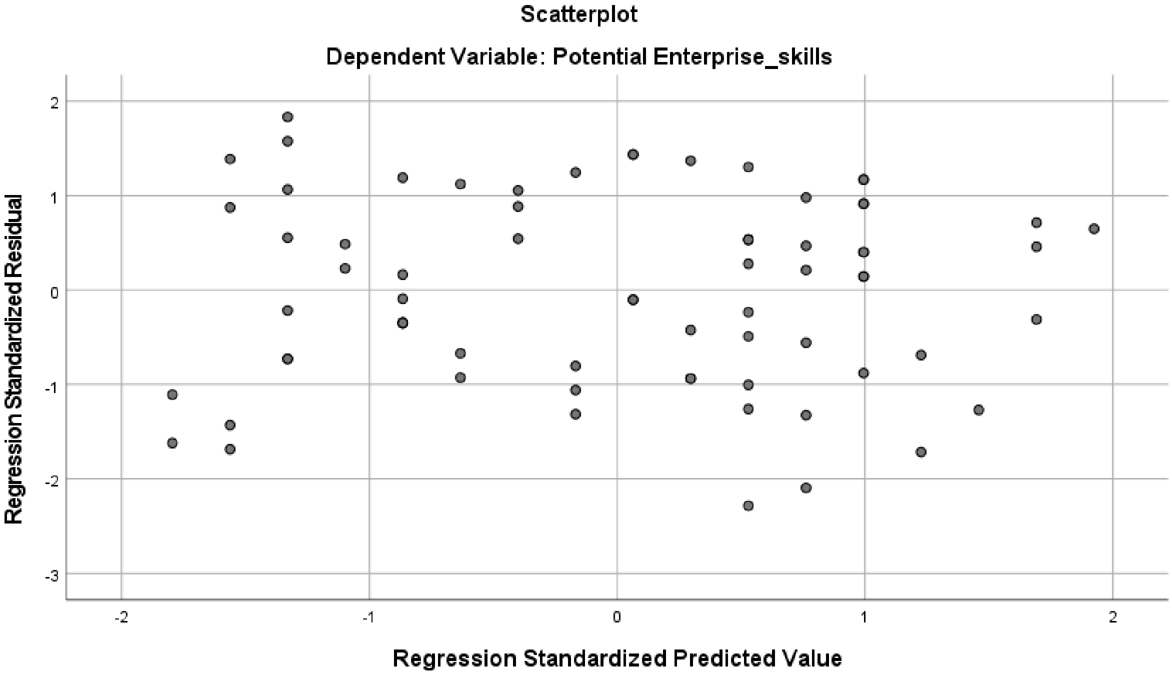
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3.0805	4.1176	3.5810	.27891	72
Residual	-2.22867	1.78990	.00000	.96924	72
Std. Predicted Value	-1.795	1.924	.000	1.000	72
Std. Residual	-2.283	1.834	.000	.993	72

a. Dependent Variable: Potential Enterprise_skills

Charts


Histogram
Dependent Variable: Potential Enterprise_skills
Mean = 2.28E-16
Std. Dev. = 0.993
N = 72
Frequency
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Enterprise_skills
Expected Cum Prob
Observed Cum Prob

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REGRESSION
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  /NOORIGIN
  /DEPENDENT P_Teacher_Role
  /METHOD=ENTER C_Real_world_experience
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  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
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Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Teacher role	3.3627	.84187	72
Current Real world experience	2.9306	1.07568	72

Correlations

		Potential Teacher role	Current Real world experience
Pearson Correlation	Potential Teacher role	1.000	.391
	Current Real world experience	.391	1.000
Sig. (1-tailed)	Potential Teacher role	.	.000
	Current Real world experience	.000	.
N	Potential Teacher role	72	72
	Current Real world experience	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method

1	Current Real world experience[b]	.	Enter

a. Dependent Variable: Potential Teacher role

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.391[a]	.153	.141	.78033	.153	12.641	1	70	.001

a. Predictors: (Constant), Current Real world experience

b. Dependent Variable: Potential Teacher role

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.697	1	7.697	12.641	.001[b]
	Residual	42.624	70	.609		
	Total	50.321	71			

a. Dependent Variable: Potential Teacher role

b. Predictors: (Constant), Current Real world experience

Coefficients[a]

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B

		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.466	.269		9.182	.000	1.930	3.001
	Current Real world experience	.306	.086	.391	3.555	.001	.134	.478

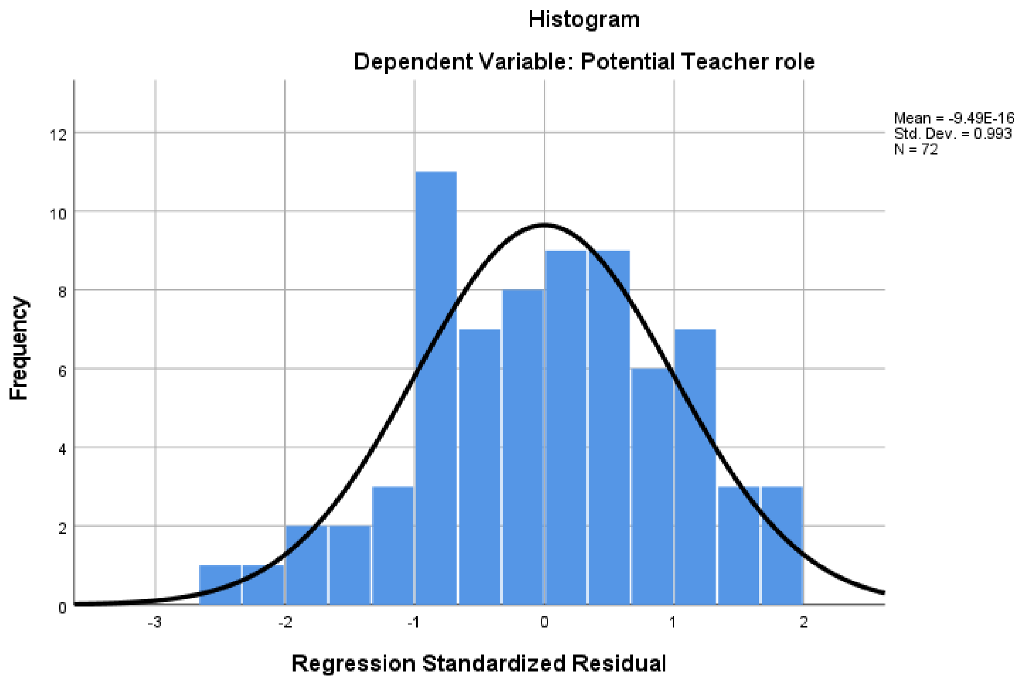
a. Dependent Variable: Potential Teacher role

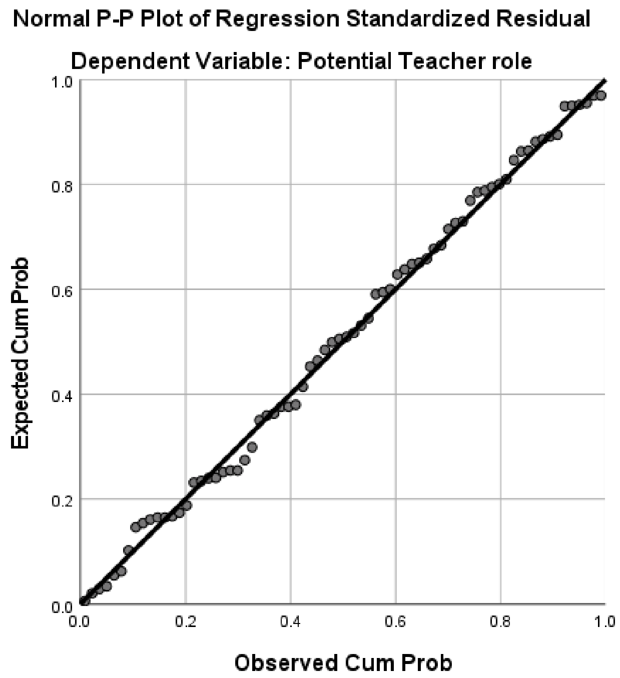
Residuals Statistics[a]

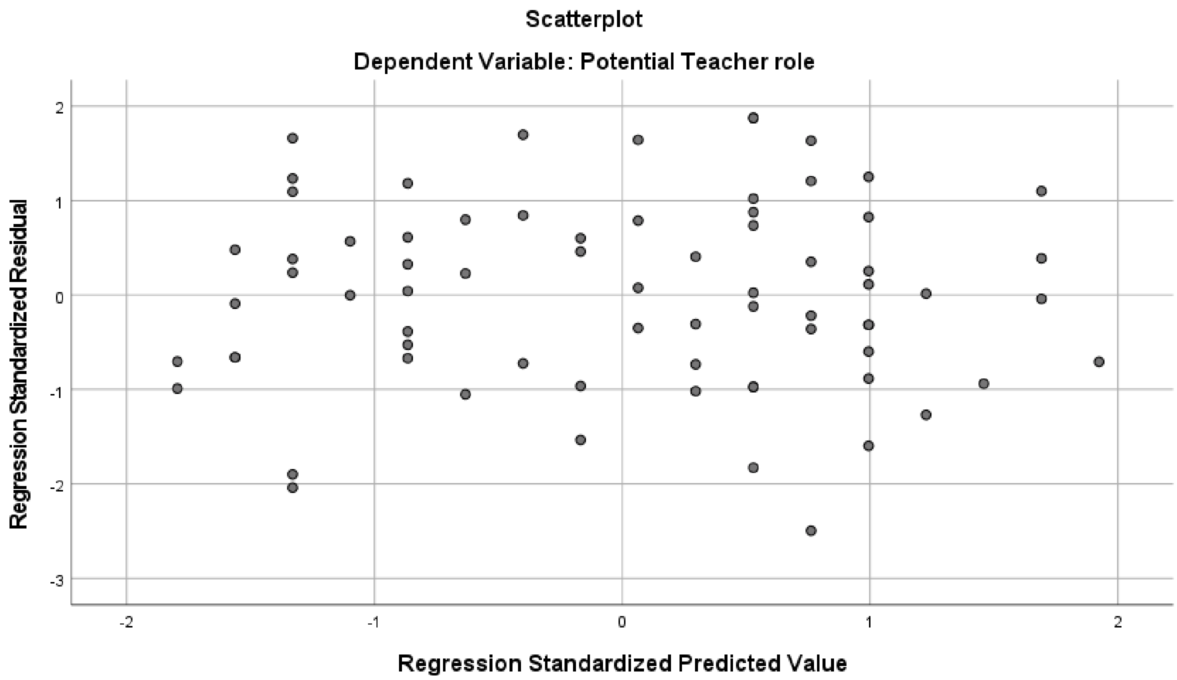
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.7717	3.9961	3.3627	.32926	72
Residual	-1.94682	1.46304	.00000	.77481	72
Std. Predicted Value	-1.795	1.924	.000	1.000	72
Std. Residual	-2.495	1.875	.000	.993	72

a. Dependent Variable: Potential Teacher role

Charts


Histogram
Dependent Variable: Potential Teacher role
Mean = -9.49E-16
Std. Dev. = 0.993
N = 72
Frequency
12
10
8
6
4
2
0
-3
-2
-1
0
1
2
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Teacher role
Expected Cum Prob
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Observed Cum Prob

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  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
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  /NOORIGIN
  /DEPENDENT P_Stakeholder
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  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Stakeholder involvement	2.9613	1.05580	72
Current Enterprise skills	2.8785	.98492	72

Correlations

		Potential Stakeholder involvement	Current Enterprise skills
Pearson Correlation	Potential Stakeholder involvement	1.000	.524
	Current Enterprise skills	.524	1.000
Sig. (1-tailed)	Potential Stakeholder involvement	.	.000
	Current Enterprise skills	.000	.
N	Potential Stakeholder involvement	72	72
	Current Enterprise skills	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method

1	Current Enterprise skills[b]	.	Enter

a. Dependent Variable: Potential Stakeholder involvement

b. All requested variables entered.

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.524[a]	.275	.265	.90541	.275	26.547	1	70	.000

a. Predictors: (Constant), Current Enterprise skills

b. Dependent Variable: Potential Stakeholder involvement

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.762	1	21.762	26.547	.000[b]
	Residual	57.383	70	.820		
	Total	79.145	71			

a. Dependent Variable: Potential Stakeholder involvement

b. Predictors: (Constant), Current Enterprise skills

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.343	.332		4.050	.000	.682	2.005
	Current Enterprise skills	.562	.109	.524	5.152	.000	.345	.780

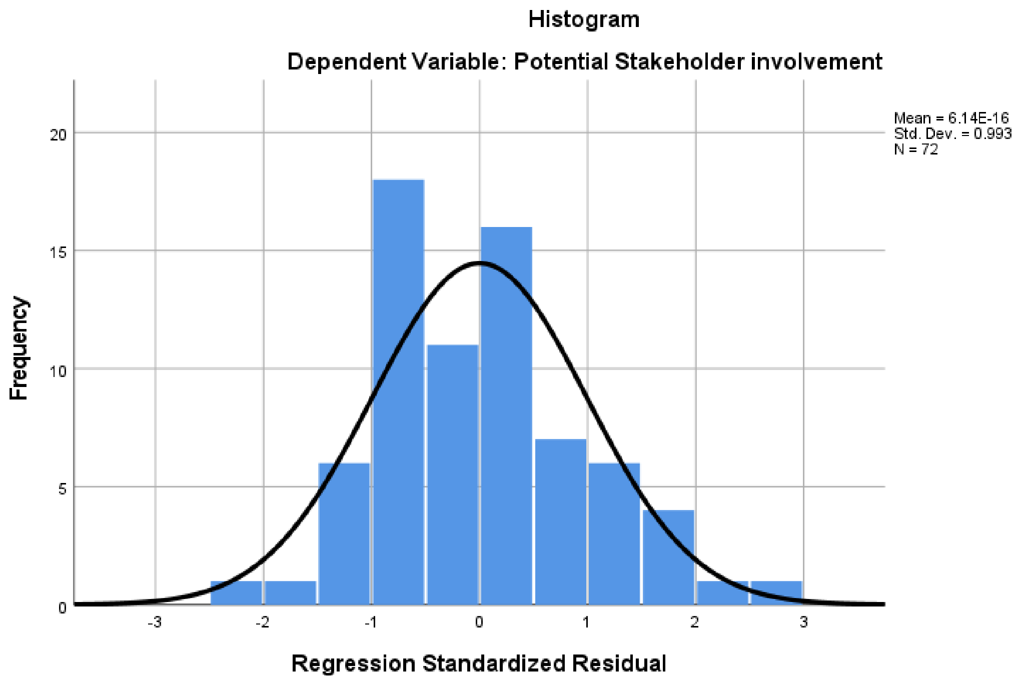
a. Dependent Variable: Potential Stakeholder involvement

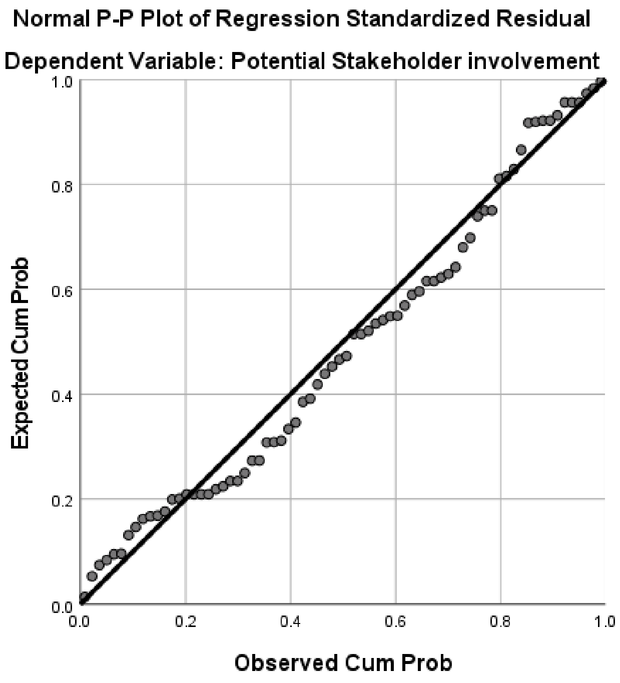
Residuals Statistics[a]

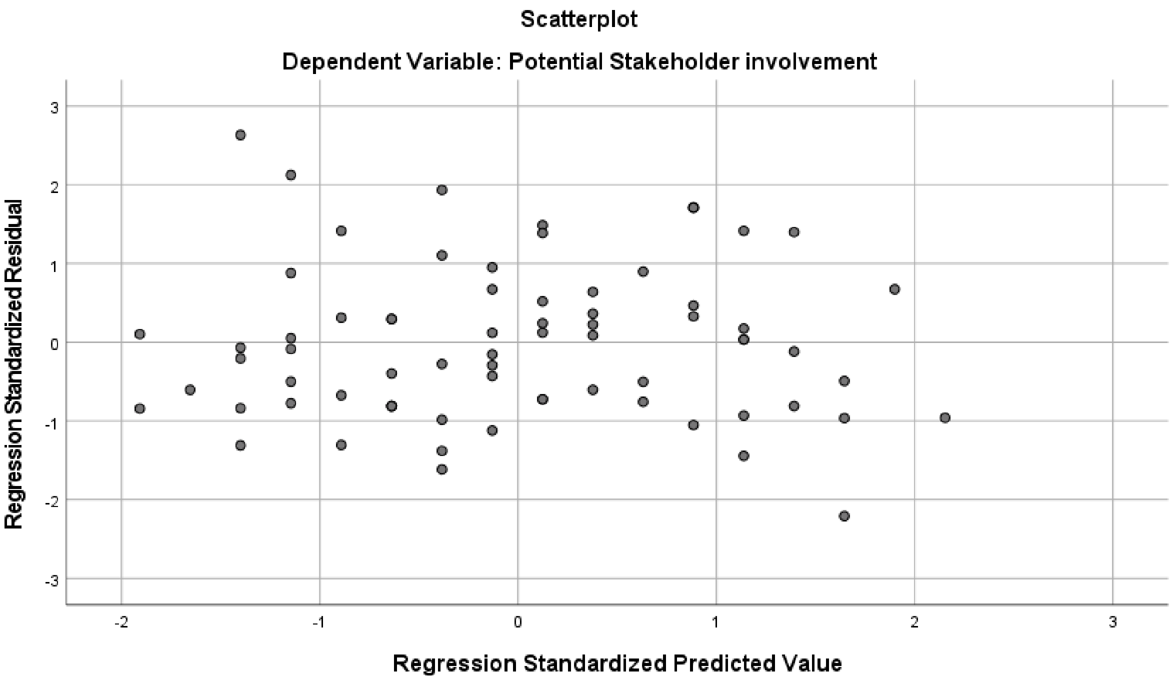
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.9054	4.1538	2.9613	.55363	72
Residual	-1.99779	2.38498	.00000	.89901	72
Std. Predicted Value	-1.907	2.154	.000	1.000	72
Std. Residual	-2.207	2.634	.000	.993	72

a. Dependent Variable: Potential Stakeholder involvement

Charts


Histogram
Dependent Variable: Potential Stakeholder involvement
Mean = 6.14E-16
Std. Dev. = 0.993
N = 72
Frequency
0
5
10
15
20
-3
-2
-1
0
1
2
3
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Stakeholder involvement
Expected Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0
Observed Cum Prob

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REGRESSION
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  /NOORIGIN
  /DEPENDENT P_Flexible_Learning_Path
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  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Flexible Learning path	2.9609	.84345	72
Current Enterprise skills	2.8785	.98492	72

Correlations

		Potential Flexible Learning path	Current Enterprise skills
Pearson Correlation	Potential Flexible Learning path	1.000	.338
	Current Enterprise skills	.338	1.000
Sig. (1-tailed)	Potential Flexible Learning path	.	.002
	Current Enterprise skills	.002	.
N	Potential Flexible Learning path	72	72
	Current Enterprise skills	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method

1	Current Enterprise skills[b]	.	Enter

a. Dependent Variable: Potential Flexible Learning path

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.338[a]	.114	.101	.79960	.114	9.000	1	70	.004

a. Predictors: (Constant), Current Enterprise skills

b. Dependent Variable: Potential Flexible Learning path

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.754	1	5.754	9.000	.004[b]
	Residual	44.755	70	.639		
	Total	50.510	71			

a. Dependent Variable: Potential Flexible Learning path

b. Predictors: (Constant), Current Enterprise skills

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	Upper Bound
1	(Constant)	2.129	.293		7.268	.000	1.545	2.713
	Current Enterprise skills	.289	.096	.338	3.000	.004	.097	.481

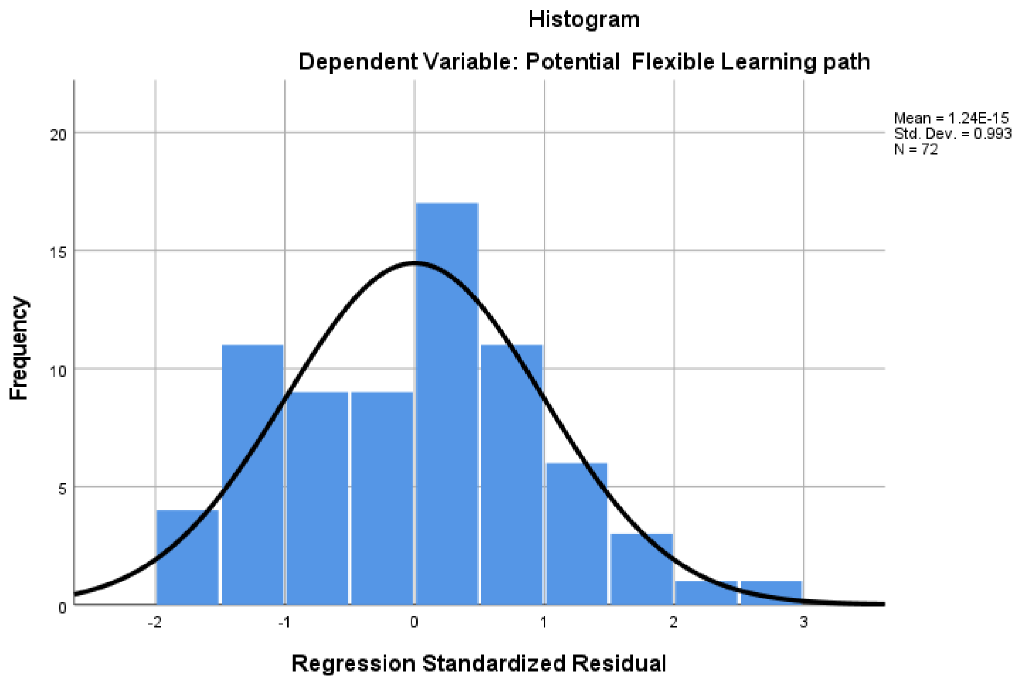
a. Dependent Variable: Potential Flexible Learning path

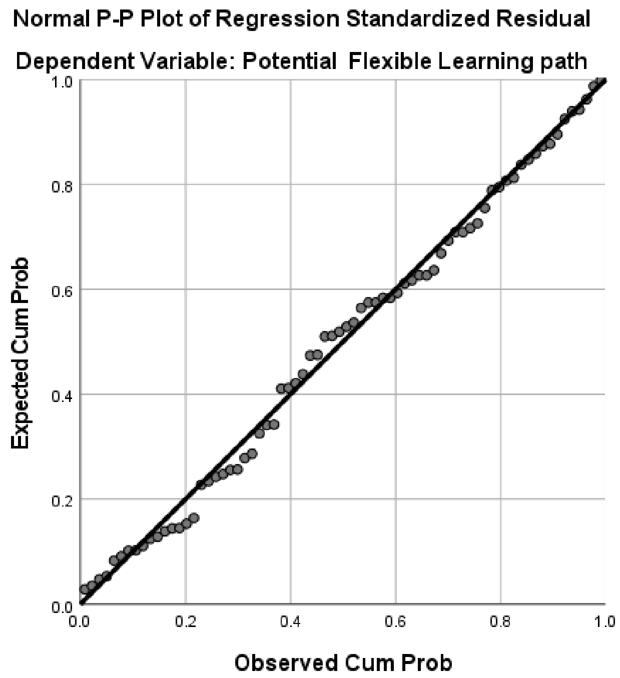
Residuals Statistics[a]

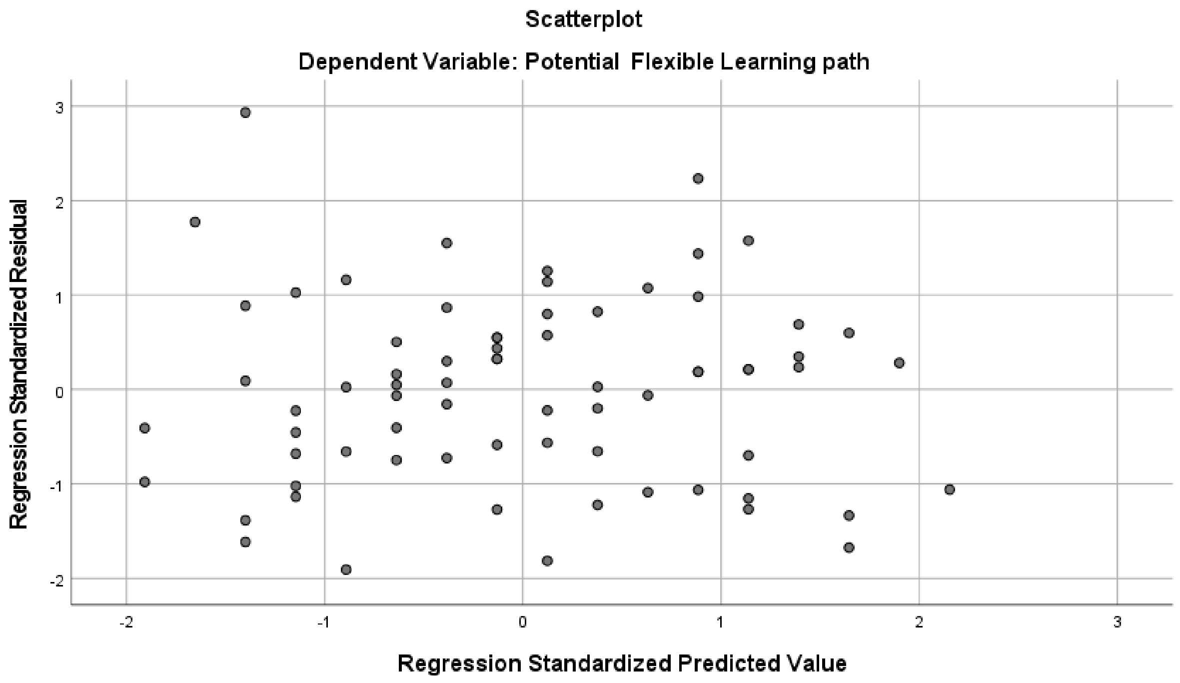
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.4179	3.5741	2.9609	.28468	72
Residual	-1.52513	2.34667	.00000	.79395	72
Std. Predicted Value	-1.907	2.154	.000	1.000	72
Std. Residual	-1.907	2.935	.000	.993	72

a. Dependent Variable: Potential Flexible Learning path

Charts


Histogram
Dependent Variable: Potential Flexible Learning path
Mean = 1.24E-15
Std. Dev. = 0.993
N = 72
Frequency
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Flexible Learning path
Expected Cum Prob
Observed Cum Prob

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REGRESSION
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  /NOORIGIN
  /DEPENDENT P_Real_World_Experience
  /METHOD=ENTER C_Enterprise_skills
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Real World Experience	3.4329	1.13932	72
Current Enterprise skills	2.8785	.98492	72

Correlations

		Potential Real World Experience	Current Enterprise skills
Pearson Correlation	Potential Real World Experience	1.000	.264
	Current Enterprise skills	.264	1.000
Sig. (1-tailed)	Potential Real World Experience	.	.013
	Current Enterprise skills	.013	.
N	Potential Real World Experience	72	72
	Current Enterprise skills	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method

1	Current Enterprise skills[b]	.	Enter

a. Dependent Variable: Potential Real World Experience

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.264[a]	.070	.056	1.10670	.070	5.247	1	70	.025

a. Predictors: (Constant), Current Enterprise skills

b. Dependent Variable: Potential Real World Experience

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.426	1	6.426	5.247	.025[b]
	Residual	85.736	70	1.225		
	Total	92.162	71			

a. Dependent Variable: Potential Real World Experience

b. Predictors: (Constant), Current Enterprise skills

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	Upper Bound
1	(Constant)	2.554	.405		6.299	.000	1.745	3.362
	Current Enterprise skills	.305	.133	.264	2.291	.025	.039	.571

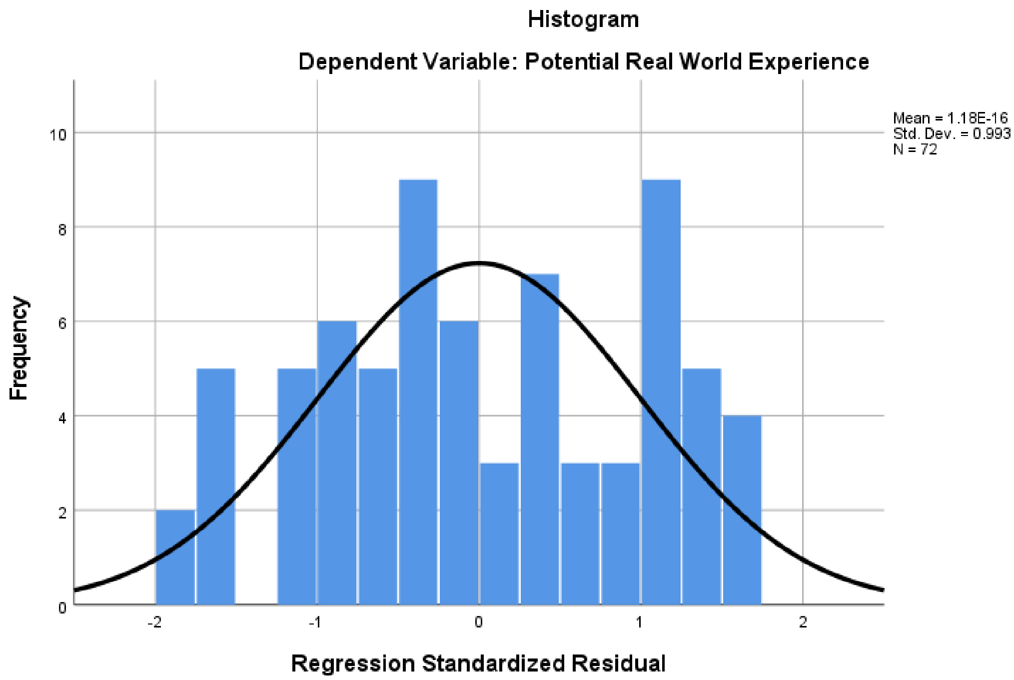
a. Dependent Variable: Potential Real World Experience

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.8591	4.0809	3.4329	.30084	72
Residual	-2.01182	1.83546	.00000	1.09888	72
Std. Predicted Value	-1.907	2.154	.000	1.000	72
Std. Residual	-1.818	1.658	.000	.993	72

a. Dependent Variable: Potential Real World Experience

Charts


Histogram
Dependent Variable: Potential Real World Experience
Mean = 1.18E-16
Std. Dev. = 0.993
N = 72
Frequency
10
8
6
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2
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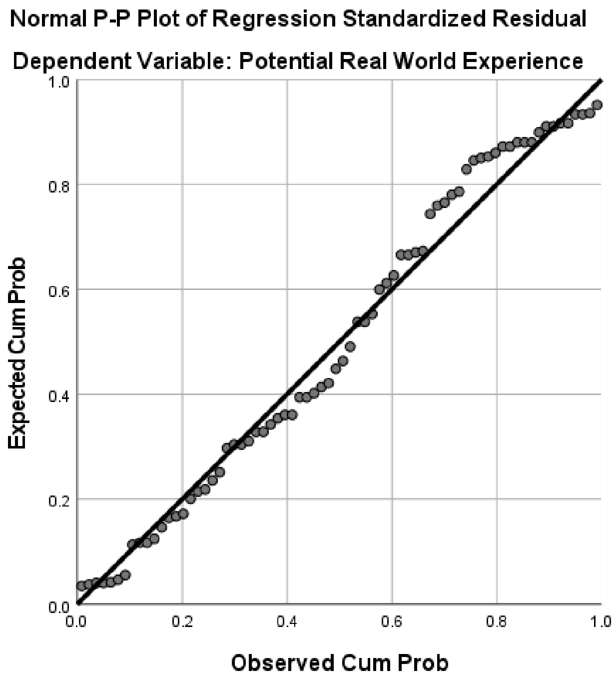
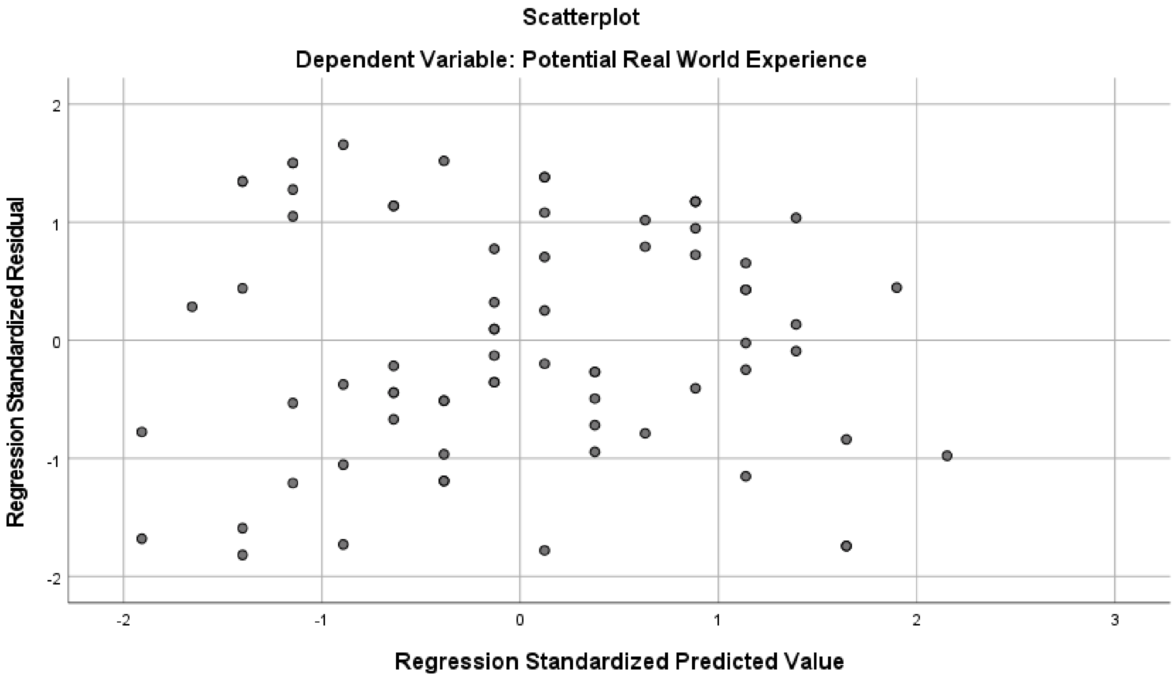
1
2
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Real World Experience
Expected Cum Prob
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Observed Cum Prob

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REGRESSION
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  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Teacher_Role
  /METHOD=ENTER C_Enterprise_skills
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Teacher role	3.3627	.84187	72
Current Enterprise skills	2.8785	.98492	72

Correlations

		Potential Teacher role	Current Enterprise skills
Pearson Correlation	Potential Teacher role	1.000	.312
	Current Enterprise skills	.312	1.000
Sig. (1-tailed)	Potential Teacher role	.	.004
	Current Enterprise skills	.004	.
N	Potential Teacher role	72	72
	Current Enterprise skills	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method

1	Current Enterprise skills[b]	.	Enter

a. Dependent Variable: Potential Teacher role

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.312[a]	.097	.084	.80554	.097	7.549	1	70	.008

a. Predictors: (Constant), Current Enterprise skills

b. Dependent Variable: Potential Teacher role

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.898	1	4.898	7.549	.008[b]
	Residual	45.422	70	.649		
	Total	50.321	71			

a. Dependent Variable: Potential Teacher role

b. Predictors: (Constant), Current Enterprise skills

Coefficients[a]

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B

		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.595	.295		8.794	.000	2.006	3.184
	Current Enterprise skills	.267	.097	.312	2.748	.008	.073	.460

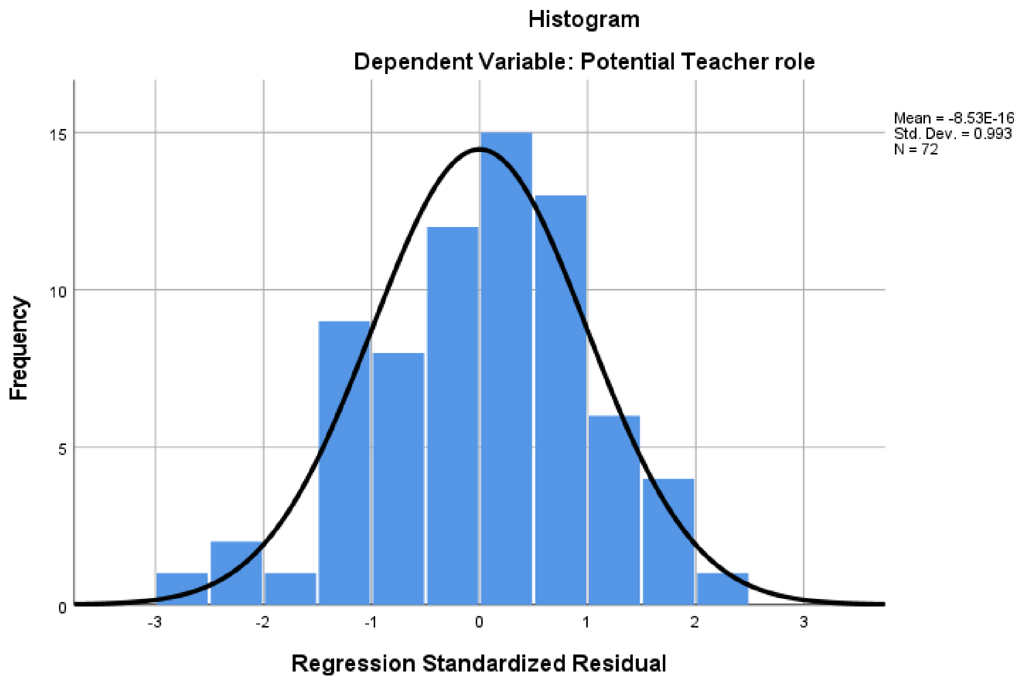
a. Dependent Variable: Potential Teacher role

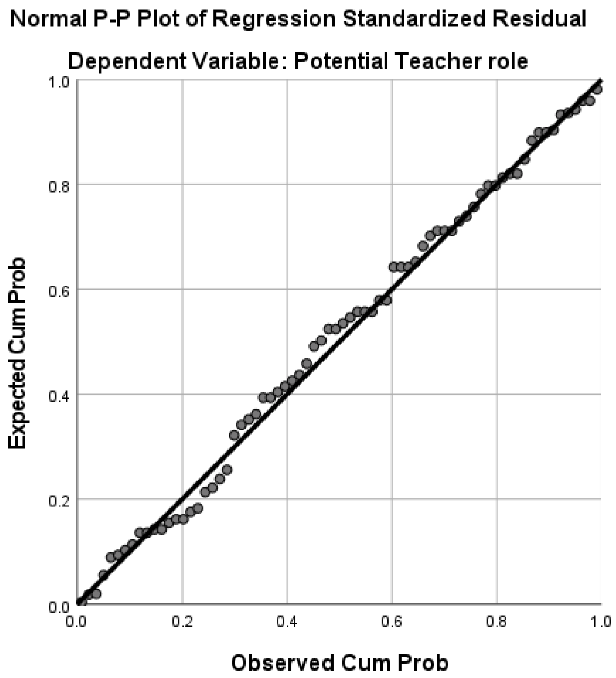
Residuals Statistics[a]

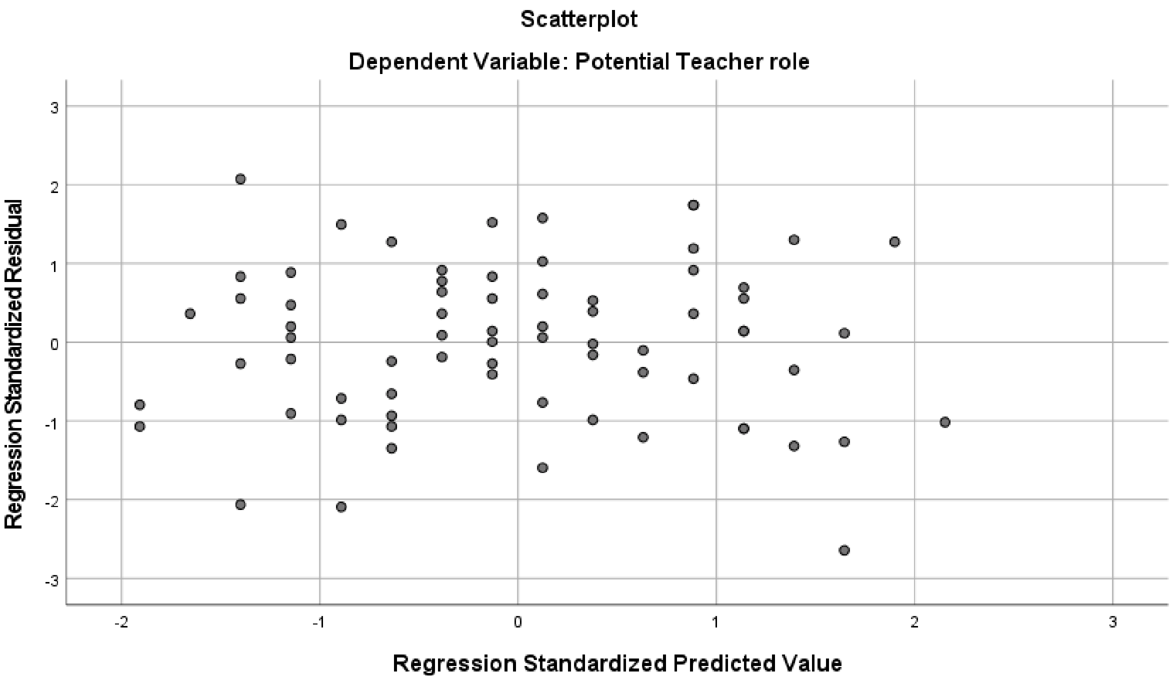
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.8617	3.9284	3.3627	.26266	72
Residual	-2.12842	1.67163	.00000	.79985	72
Std. Predicted Value	-1.907	2.154	.000	1.000	72
Std. Residual	-2.642	2.075	.000	.993	72

a. Dependent Variable: Potential Teacher role

Charts


Histogram
Dependent Variable: Potential Teacher role
Mean = -8.53E-16
Std. Dev. = 0.993
N = 72
Frequency
15
10
5
0
-3
-2
-1
0
1
2
3
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Teacher role
Expected Cum Prob
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Observed Cum Prob




```
REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Stakeholder
  /METHOD=ENTER C_Teacher_role
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Stakeholder involvement	2.9613	1.05580	72
Current Teacher role	3.0328	.75518	72

Correlations

		Potential Stakeholder involvement	Current Teacher role
Pearson Correlation	Potential Stakeholder involvement	1.000	.581
	Current Teacher role	.581	1.000
Sig. (1-tailed)	Potential Stakeholder involvement	.	.000
	Current Teacher role	.000	.
N	Potential Stakeholder involvement	72	72
	Current Teacher role	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Teacher role[b]	.	Enter

a. Dependent Variable: Potential Stakeholder involvement

b. All requested variables entered.

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.581[a]	.337	.328	.86578	.337	35.587	1	70	.000

a. Predictors: (Constant), Current Teacher role

b. Dependent Variable: Potential Stakeholder involvement

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.675	1	26.675	35.587	.000[b]
	Residual	52.470	70	.750		
	Total	79.145	71			

a. Dependent Variable: Potential Stakeholder involvement

b. Predictors: (Constant), Current Teacher role

Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
Model		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	.500	.425		1.176	.244	-.348	1.347

Current Teacher role	.812	.136	.581	5.966	.000	.540	1.083

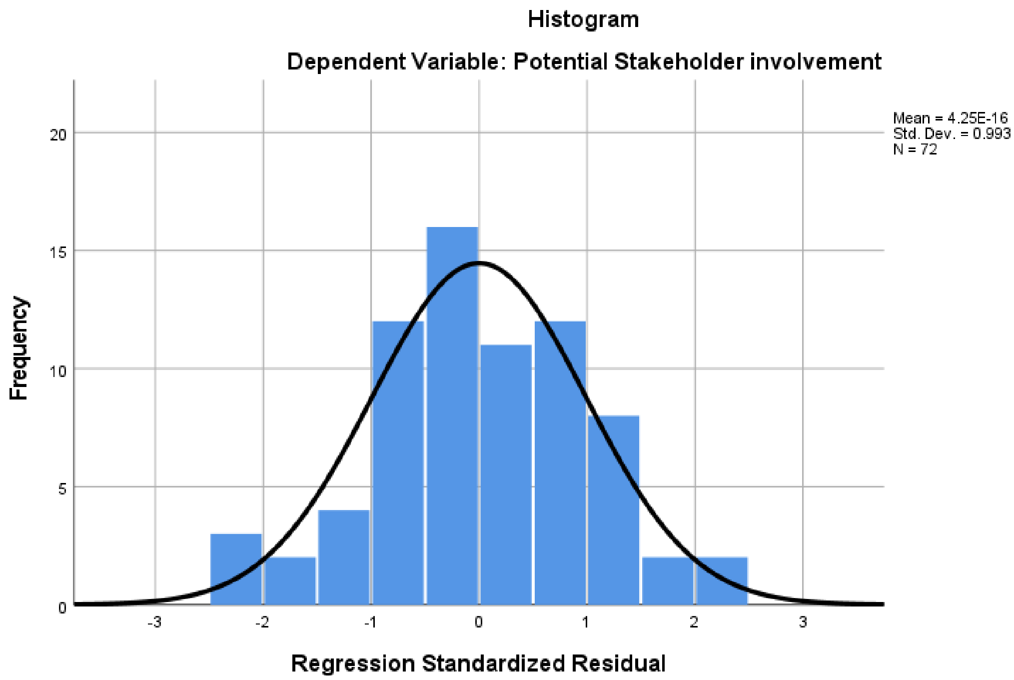
a. Dependent Variable: Potential Stakeholder involvement

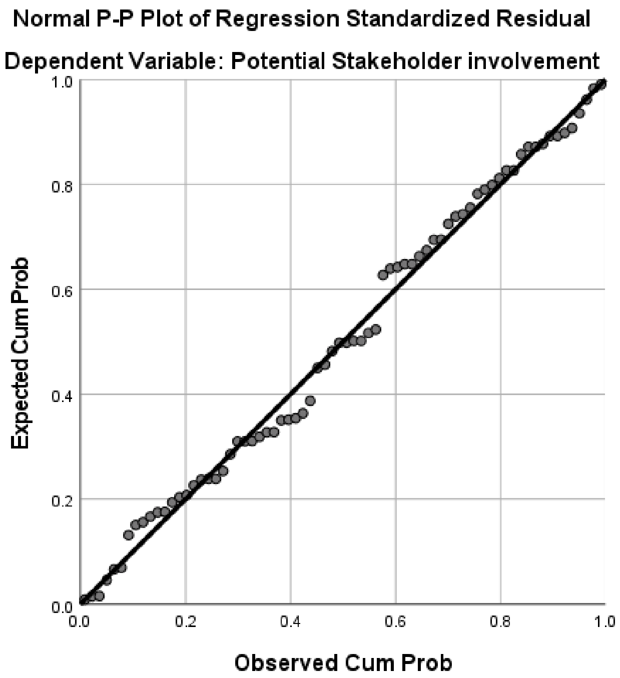
Residuals Statistics[a]

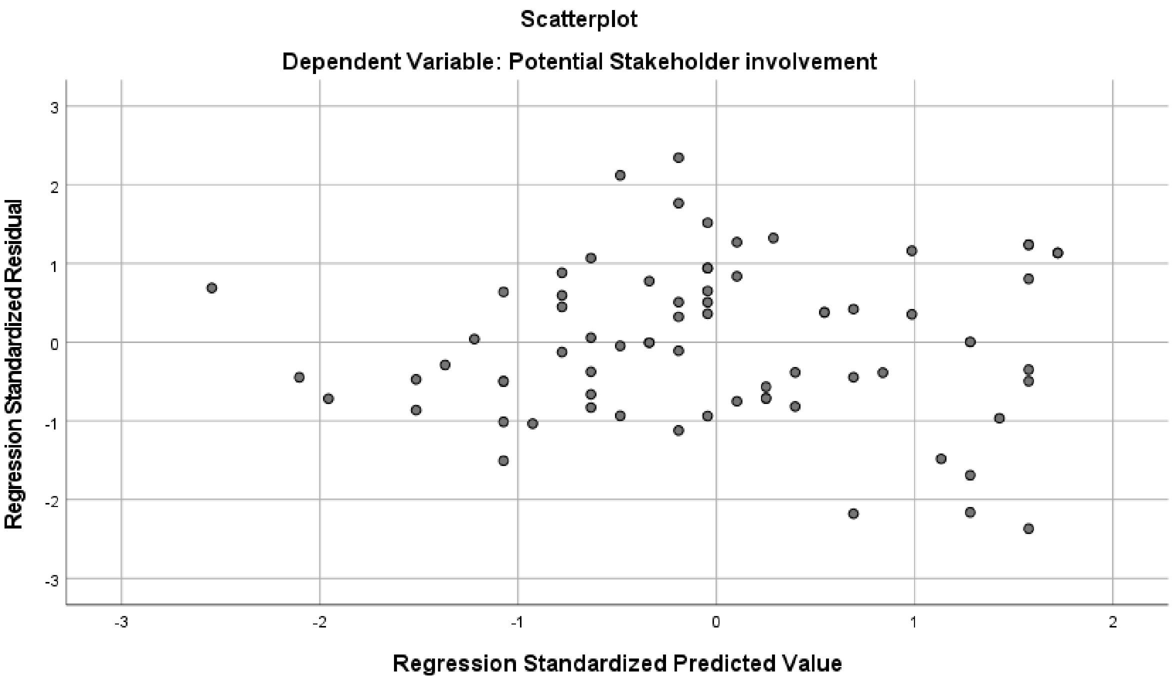
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.4016	4.0169	2.9613	.61295	72
Residual	-2.05172	2.03049	.00000	.85966	72
Std. Predicted Value	-2.545	1.722	.000	1.000	72
Std. Residual	-2.370	2.345	.000	.993	72

a. Dependent Variable: Potential Stakeholder involvement

Charts


Histogram
Dependent Variable: Potential Stakeholder involvement
Mean = 4.25E-16
Std. Dev. = 0.993
N = 72
Frequency
Regression Standardized Residual
0
5
10
15
20
-3
-2
-1
0
1
2
3


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Stakeholder involvement
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

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REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Flexible_Learning_Path
  /METHOD=ENTER C_Teacher_role
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Flexible Learning path	2.9609	.84345	72
Current Teacher role	3.0328	.75518	72

Correlations

		Potential Flexible Learning path	Current Teacher role
Pearson Correlation	Potential Flexible Learning path	1.000	.520
	Current Teacher role	.520	1.000
Sig. (1-tailed)	Potential Flexible Learning path	.	.000
	Current Teacher role	.000	.
N	Potential Flexible Learning path	72	72
	Current Teacher role	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Teacher role[b]	.	Enter

a. Dependent Variable: Potential Flexible Learning path

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.520[a]	.270	.260	.72565	.270	25.921	1	70	.000

a. Predictors: (Constant), Current Teacher role

b. Dependent Variable: Potential Flexible Learning path

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.649	1	13.649	25.921	.000[b]
	Residual	36.860	70	.527		
	Total	50.510	71			

a. Dependent Variable: Potential Flexible Learning path

b. Predictors: (Constant), Current Teacher role

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.200	.356		3.368	.001	.489	1.911

Current Teacher role	.581	.114	.520	5.091	.000	.353	.808

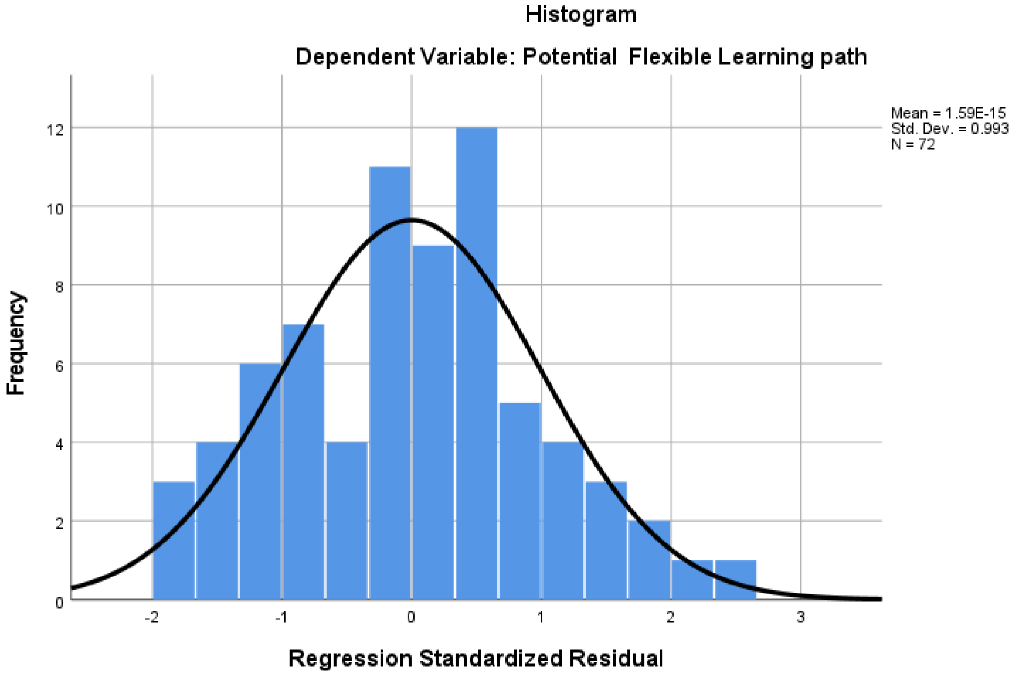
a. Dependent Variable: Potential Flexible Learning path

Residuals Statistics[a]

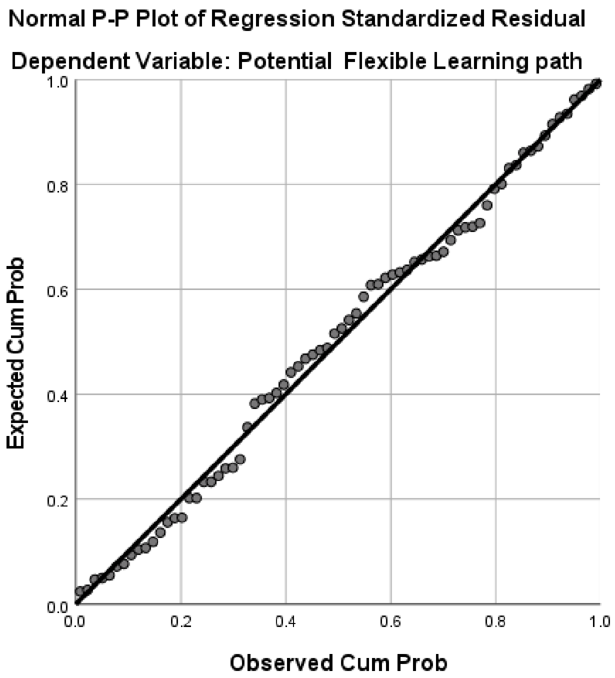
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.8451	3.7159	2.9609	.43846	72
Residual	-1.43151	1.73266	.00000	.72053	72
Std. Predicted Value	-2.545	1.722	.000	1.000	72
Std. Residual	-1.973	2.388	.000	.993	72

a. Dependent Variable: Potential Flexible Learning path

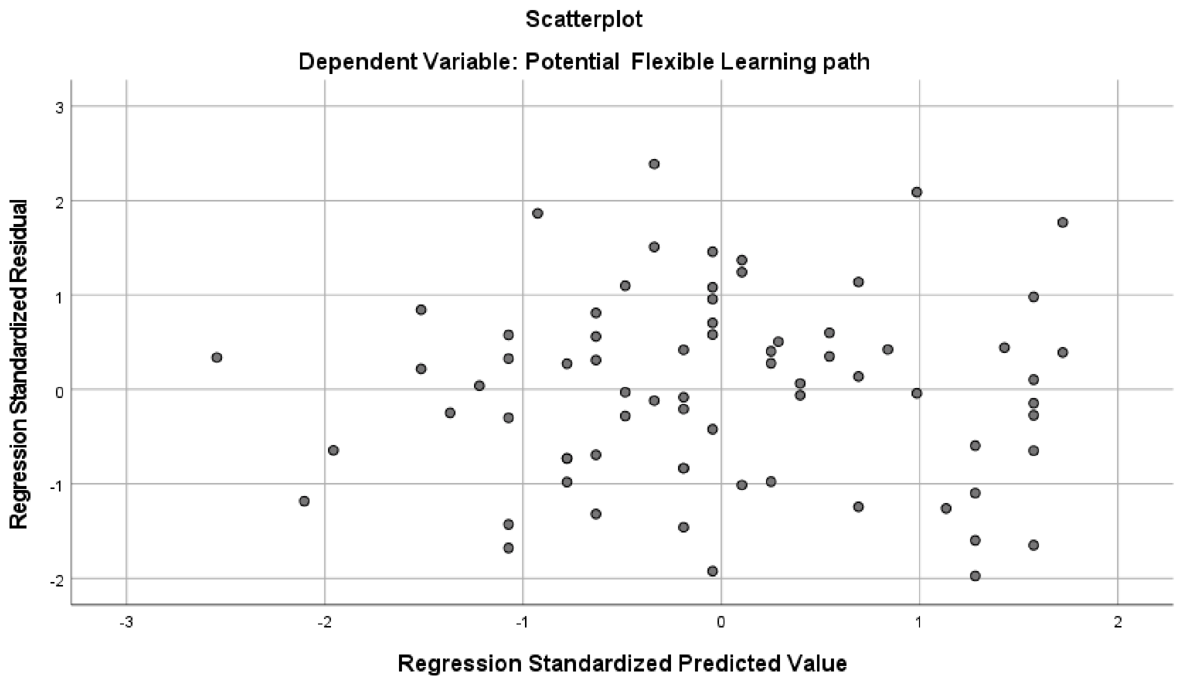
Charts



Histogram
Dependent Variable: Potential Flexible Learning path
Mean = 1.59E-15
Std. Dev. = 0.993
N = 72
Frequency
Regression Standardized Residual



Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Flexible Learning path
Expected Cum Prob
Observed Cum Prob

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REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Real_World_Experience
  /METHOD=ENTER C_Teacher_role
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Real World Experience	3.4329	1.13932	72
Current Teacher role	3.0328	.75518	72

Correlations

		Potential Real World Experience	Current Teacher role
Pearson Correlation	Potential Real World Experience	1.000	.442
	Current Teacher role	.442	1.000
Sig. (1-tailed)	Potential Real World Experience	.	.000
	Current Teacher role	.000	.
N	Potential Real World Experience	72	72
	Current Teacher role	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Teacher role[b]	.	Enter

a. Dependent Variable: Potential Real World Experience

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.442[a]	.195	.184	1.02922	.195	17.003	1	70	.000

a. Predictors: (Constant), Current Teacher role

b. Dependent Variable: Potential Real World Experience

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.012	1	18.012	17.003	.000[b]
	Residual	74.150	70	1.059		
	Total	92.162	71			

a. Dependent Variable: Potential Real World Experience

b. Predictors: (Constant), Current Teacher role

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.410	.505		2.791	.007	.402	2.418

Current Teacher role	.667	.162	.442	4.124	.000	.344	.990

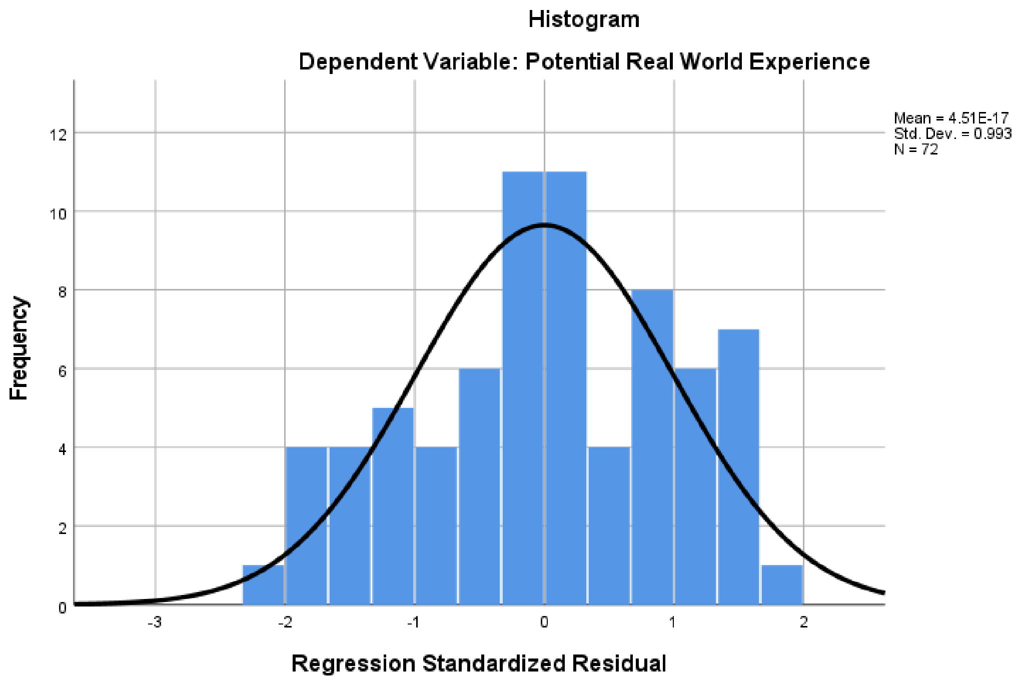
a. Dependent Variable: Potential Real World Experience

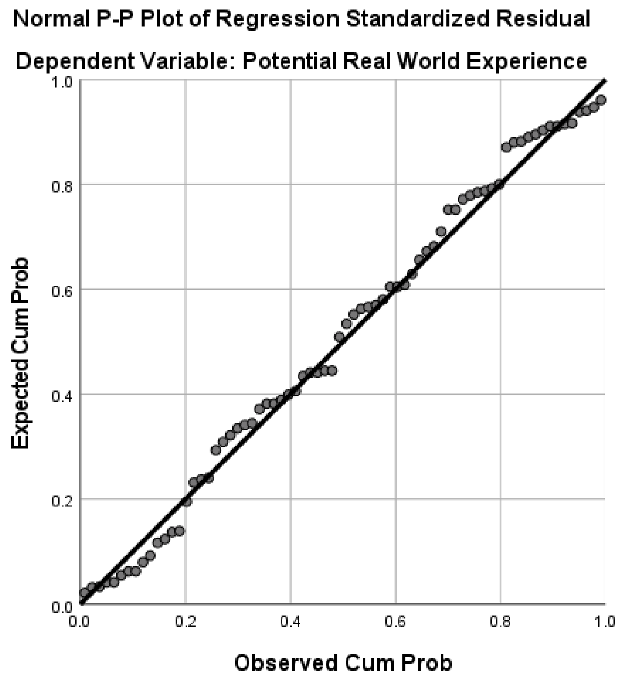
Residuals Statistics[a]

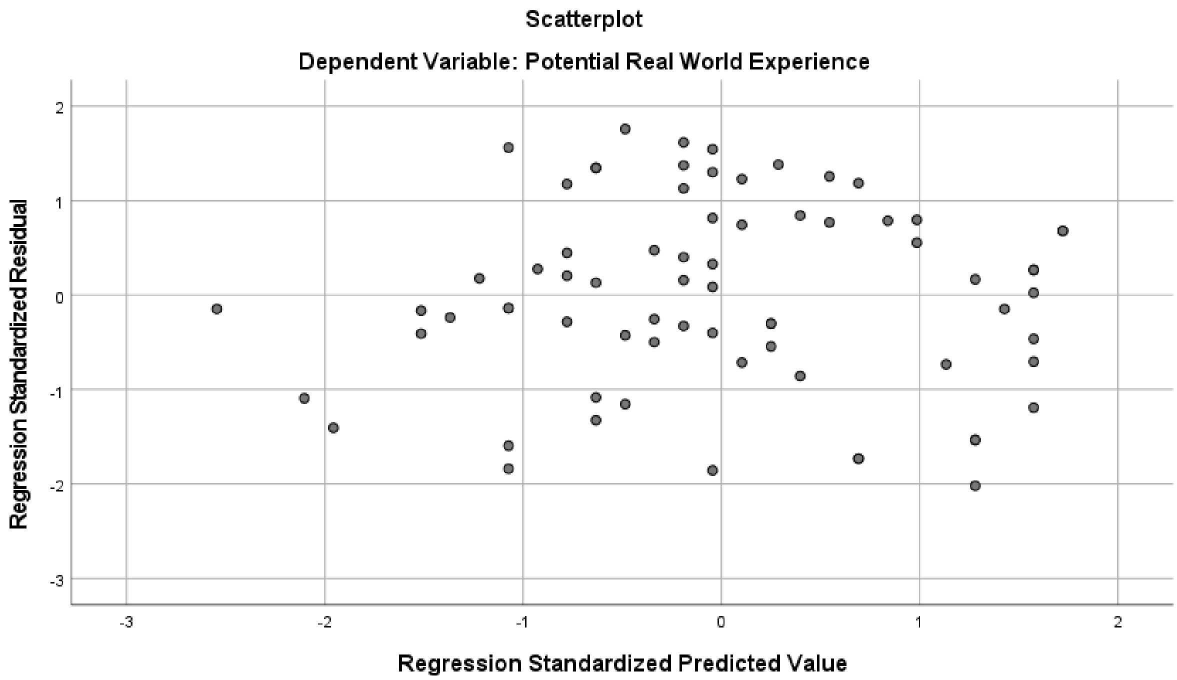
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.1512	4.3003	3.4329	.50367	72
Residual	-2.07795	1.81132	.00000	1.02194	72
Std. Predicted Value	-2.545	1.722	.000	1.000	72
Std. Residual	-2.019	1.760	.000	.993	72

a. Dependent Variable: Potential Real World Experience

Charts


Histogram
Dependent Variable: Potential Real World Experience
Mean = 4.51E-17
Std. Dev. = 0.993
N = 72
Frequency
0
2
4
6
8
10
12
-3
-2
-1
0
1
2
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Real World Experience
Expected Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0
Observed Cum Prob




```
REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Enterprise_skills
  /METHOD=ENTER C_Teacher_role
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Potential Enterprise_skills	3.5810	1.00857	72
Current Teacher role	3.0328	.75518	72

Correlations

		Potential Enterprise_skills	Current Teacher role
Pearson Correlation	Potential Enterprise_skills	1.000	.332
	Current Teacher role	.332	1.000
Sig. (1-tailed)	Potential Enterprise_skills	.	.002
	Current Teacher role	.002	.
N	Potential Enterprise_skills	72	72
	Current Teacher role	72	72

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Current Teacher role[b]	.	Enter

a. Dependent Variable: Potential Enterprise_skills

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.332[a]	.111	.098	.95796	.111	8.700	1	70	.004

a. Predictors: (Constant), Current Teacher role

b. Dependent Variable: Potential Enterprise_skills

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.984	1	7.984	8.700	.004[b]
	Residual	64.238	70	.918		
	Total	72.222	71			

a. Dependent Variable: Potential Enterprise_skills

b. Predictors: (Constant), Current Teacher role

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.234	.470		4.751	.000	1.296	3.172

Current Teacher role	.444	.151	.332	2.950	.004	.144	.744

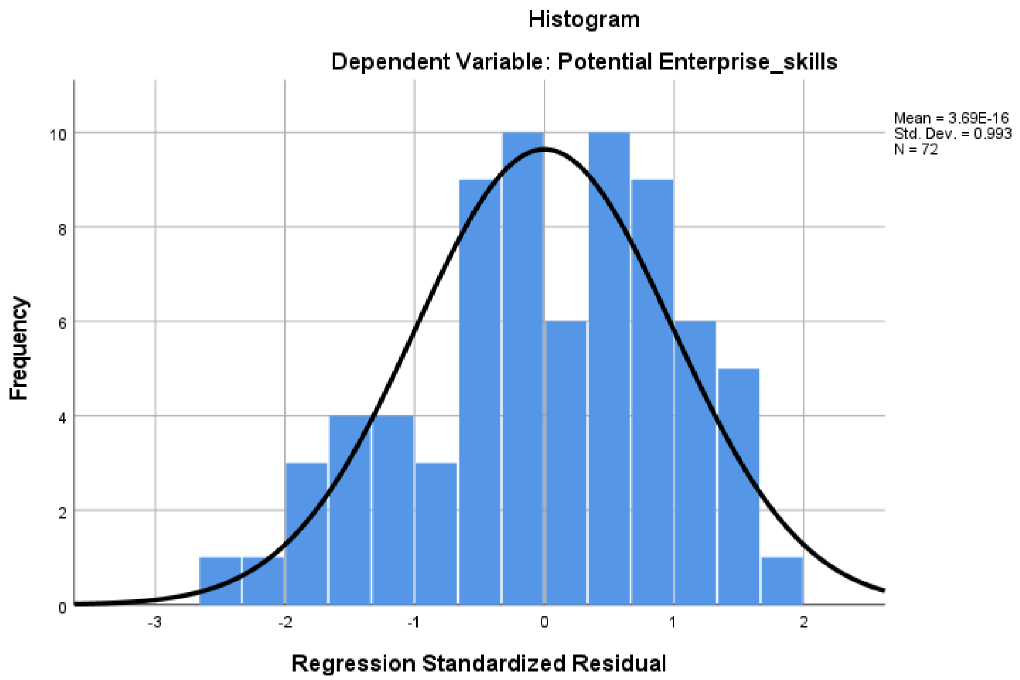
a. Dependent Variable: Potential Enterprise_skills

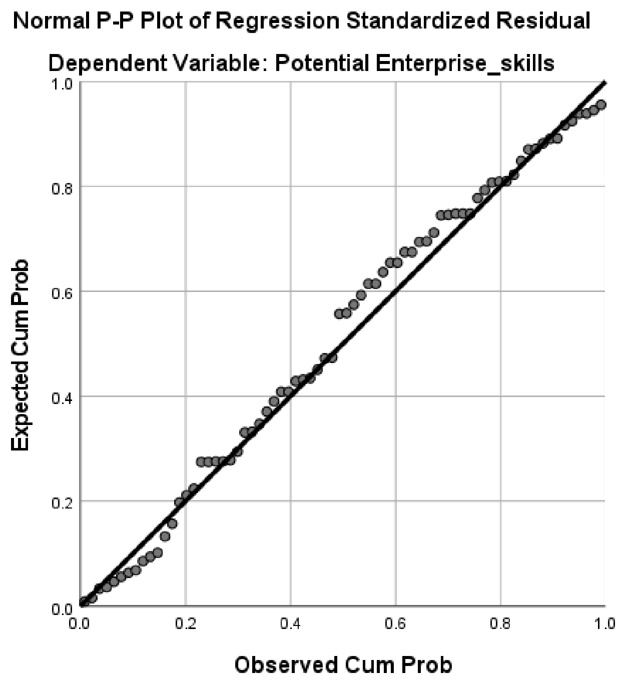
Residuals Statistics[a]

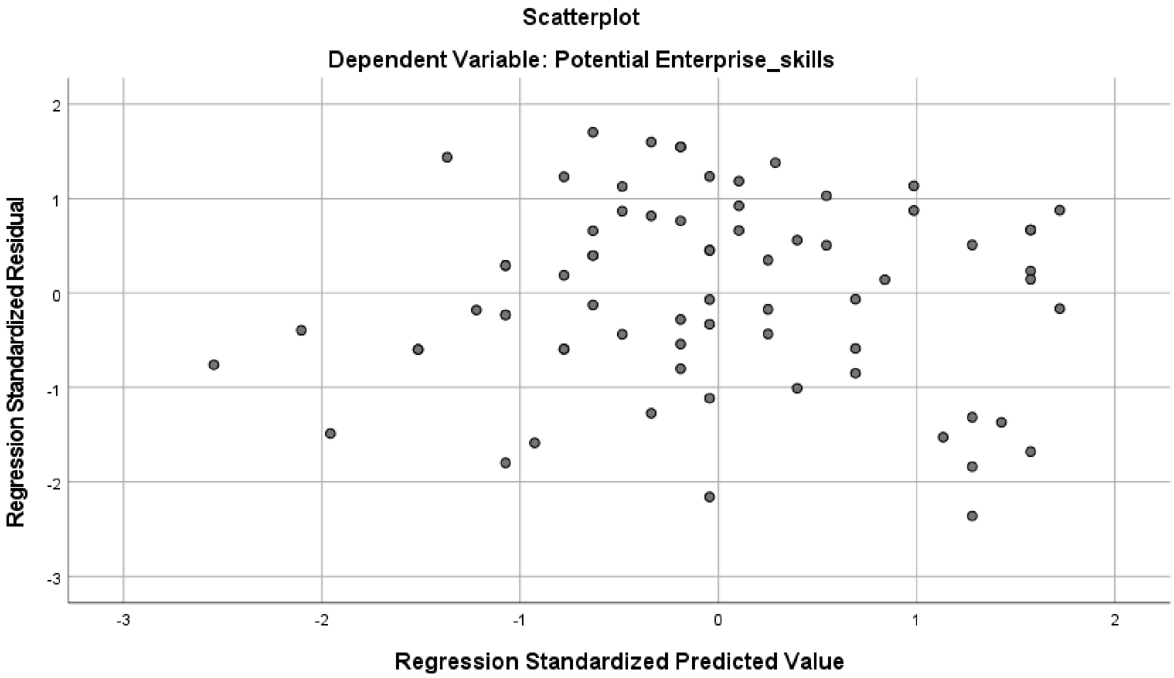
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.7277	4.1585	3.5810	.33534	72
Residual	-2.26050	1.63090	.00000	.95119	72
Std. Predicted Value	-2.545	1.722	.000	1.000	72
Std. Residual	-2.360	1.702	.000	.993	72

a. Dependent Variable: Potential Enterprise_skills

Charts


Histogram
Dependent Variable: Potential Enterprise_skills
Mean = 3.69E-16
Std. Dev. = 0.993
N = 72
Frequency
10
8
6
4
2
0
-3
-2
-1
0
1
2
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Potential Enterprise_skills
Expected Cum Prob
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Observed Cum Prob


Scatterplot
Dependent Variable: Potential Enterprise_skills
Regression Standardized Residual
Regression Standardized Predicted Value
2
1
0
-1
-2
-3
-3
-2
-1
0
1
2