DEVELOPMENT OF A SELF-DIRECTED PROFESSIONAL LEARNING SCALE HUMAN CAPITAL-ORIENTED FOR VOCATIONAL HIGH SCHOOL TEACHERS IN BUSSINES AND MANAGEMENT SUBJECTS

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ABSTRAK

Tujuan penelitian ini adalah untuk menyusun alat ukur penilaian self-directed professional learning (SDPL) pada guru SMK dalam kerangka human capital. Penelitian ini dilakukan dengan menggunakan sampel sebanyak 307 guru yang mengajar mata pelajaran produktif bidang manajemen dan bisnis di beberapa sekolah menengah kejuruan yang berlokasi di provinsi Jawa Timur, Indonesia. Kebaruan penelitian ini adalah pengembangan dan validasi instrumen yang disebut instrumen SPDL untuk menilai kemampuan SDPL guru SMK. Selain itu, untuk menilai reliabilitas dan validitas suatu konstruk yang diukur dengan menggunakan skala reflektif, perlu dilakukan uji koefisien Cronbach Alpha dan Average Variance Extracted (AVE). Seluruh indikator idealnya berada di atas ambang batas 0,8. Berdasarkan bukti yang ada, dapat disimpulkan bahwa 34 item tersebut di atas memiliki kualitas validitas dan reliabilitas yang diperlukan, sehingga sesuai untuk digunakan sebagai skala SDPL.
Kata Kunci: Pengembangan*,* Validasi, Skala Instrumen*, Self-Directed Professional Learning* Guru.

ABSTRACT

The objective of this study was to construct a measurement tool for evaluating self-directed professional learning (SDPL) among teachers in Vocational High Schools within the framework of human capital. The research was carried out using a sample size of 307 teachers who were instructing business management productive subjects at several vocational high schools located in the province of East Java, Indonesia. The novelty of this research is the development and validation of an instrument called the SPDL instrument to assess the SDPL abilities of vocational teachers. In addition, in order to assess the reliability and validity of a construct measured using a reflective scale, it is necessary to examine the Cronbach Alpha coefficient and the Average Variance Extracted (AVE). All indicators ideally above a threshold of 0.8. Based on

the available evidence, it can be inferred that the aforementioned 34 items possess the necessary qualities of validity and reliability, rendering them suitable for utilization as an SDPL scale.
***Keywords**: Development, Validation, Instrument Scale, Teacher Self-Directed Professional Learning*

BACKGROUND

The primary objective of this research endeavor was to construct a comprehensive measurement tool for evaluating self-directed professional learning (SDPL) among teachers in Vocational High Schools within the framework of human capital. The survey evaluated the ongoing professional development of teachers at SDPL in their roles as vocational high school educators. The research was conducted using a sample size of 307 educators who were instructing business management productive subjects at several vocational high schools located in the province of East Java of Indonesia. This instrument possesses the potential to be advantageous in determining the professional development requirements of educators and in adjusting the abilities demanded by the labor market. In a nation characterized by a variety of cultural backgrounds and distinct geographical regions, the aforementioned discoveries might contribute to fostering comprehension and awareness regarding the imperative requirement for instructors to acquire and refine the necessary skills and competencies. Consequently, these educators can effectively serve as conduits for knowledge transfer to students enrolled in vocational high school programs. Assess the soundness of the items within this study scale by examining the outside loadings of all the items. In addition, in order to assess the reliability and validity of a construct measured by a reflective scale, it is necessary to examine the Cronbach Alpha coefficient (with a threshold of > 0.7) and the Average Variance Extracted (AVE), which should ideally be equal to or greater than 0.5. The teacher scale known as the SDPL, which was established as part of this research, comprises a total of thirty-five statements, each of which is supported by a Likert scale ranging from 1 to 5.

The present study focuses on the development and validation of an instrument scale designed to measure teachers' self-directed professional growth. The purpose of this introductory section is to provide an overview of the topic at hand and set Various aims can be served by the utilization of metrics pertaining to self-directed learning. Nevertheless, the efficacy of self-directed learning scales is contingent upon the specific subject matter and the objectives set out by the individual learner (Koay, 2023). According to the International Labor Organization (ILO, 2021), there is a recognized imperative to allocate resources towards self-directed learning (SDL) in order to enhance the individual and collective knowledge and professional competencies of teachers, hence fostering the development of human capital (Ehlert & Souvignier, 2023). Nevertheless, the efficacy of the SDPL program's investment in teachers may be impacted by several institutional variables within schools (Kirsten et al., 2023)(Brouhier et al., 2023). Given that the self-directed professional learning (SDPL) of teachers is a fundamental requirement

for the enhancement of their human capital, it follows that any organizational factors influencing the execution of teacher SDPL may likewise impact the growth of their human capital (L. Huang et al., 2020). Teachers are responsible for implementing SDPL capabilities, and it is anticipated that educational methods will continue to evolve and enhance in order to achieve desired objectives (Mohamed Mohamed Ali El Deen, 2023). According to Louws et al. (Louws et al., 2017), educators who possess strong, self-directed professional learning (SDPL) abilities are capable of delivering educational practices that yield desired learning outcomes and foster meaningful learning experiences (N. Wang & An, 2023). Furthermore, the optimal realization of teachers' self-directed professional learning (SDPL) can be achieved when they are situated (Park & Kim, 2023) within a supportive and accommodating educational setting (Hamedinasab et al., 2023).

The novelty of this research is the development and validation of an instrument called the SPDL instrument to assess the SDPL abilities of vocational teachers. So far, SDPL has been studied and used in nursing in developing countries (Obsuth et al., 2022). This study has a specificity, namely SDPL which can be used to measure SDPL for vocational teachers according to their field of expertise (Lanzo et al., 2022). The present study aimed to create and establish the validity of a tool known as the SPDL instrument, which was designed to evaluate the SDPL (Self-Directed Professional Learning) capabilities of vocational educators. The validation and reliability of the statement items and indicators in the instrument are of utmost importance. The objective of this project is to create and verify a content-based tool that will assess the construction of SDPL teachers in vocational high schools. The SDPL indicator is derived from Glugielmino's work (Williamson, 2017) and is tailored to meet the specific requirements of vocational teachers, who aim to develop themselves as human capital through their learning endeavors. This study presents substantial empirical support regarding the reliability and validity of the Self-Directed Professional Learning (SDPL) framework within the specific local context. Consequently, it contributes to our comprehension of the efficacy of instructional practices and educational processes in promoting independent learning among teachers engaged in ongoing professional development in Indonesia. Furthermore, this study has the potential to contribute to the advancement of local wisdom-based knowledge. The utilization of correct and reliable measures can effectively aid the examination of the factors that precede and follow autonomous learning.

The present study focuses on the development and validation of an instrument scale designed to measure teachers' self-directed professional growth. The purpose of this introductory section is to provide an overview of the topic at hand and set Various aims can be served by the utilization of metrics pertaining to self-directed learning. Given that the self-directed professional learning (SDPL) of teachers is a fundamental requirement for the enhancement of their human capital (Chueh & Kao, 2024), it follows that any organizational factors (Chan et al., 2023) influencing the execution of teacher SDPL may likewise impact the growth of their human capital (Meyer et al., 2023). Teachers are responsible for implementing SDPL capabilities (Zeng, 2023), and it is anticipated that educational methods will continue to evolve

and enhance in order to achieve desired objectives. According to Louws et al. (Louws et al., 2017), educators who possess strong, self-directed professional learning (SDPL) abilities are capable of delivering educational practices that yield desired learning outcomes and foster meaningful learning experiences (Ansyari et al., 2022). Furthermore, the optimal realization of teachers' self-directed professional learning (SDPL) can be achieved when they are situated within a supportive and accommodating educational setting (Coppe et al., 2024). According to Jennings (Jennings, 2007), there is evidence suggesting that SDL is linked to various positive outcomes (Buchanan et al., 2022), including heightened curiosity (Abakah et al., 2023), improved critical thinking abilities (Nalbantoğlu & Bümen, 2024), enhanced understanding (Koellner et al., 2024) and retention of information, better decision-making skills (Copur-Gencturk et al., 2024), increased pleasure with achievements, greater motivation, improved competence, and enhanced self-confidence (de Vries et al., 2022). The aforementioned technique is well recognized and favored within the field of adult education (Şahin et al., 2024) due to its significant contributions to meeting the challenges inherent in the teaching profession (Helate et al., 2022).

This study has a specificity, namely SDPL which can be used to measure SDPL for vocational teachers in business and management subject, according to their field of expertise. The present study aimed to create and establish the validity of a tool known as the SPDL instrument, which was designed to evaluate the SDPL (Self-Directed Professional Learning) capabilities of vocational educators. The validation and reliability of the statement items and indicators in the instrument are of utmost importance. The objective of this project is to create and verify a content-based tool that will assess the construction of SDPL teachers in vocational high schools. The SDPL indicator is derived from Glugielmino's work (Williamson, 2017) and is tailored to meet the specific requirements of vocational teachers, who aim to develop themselves as human capital through their learning endeavors. This study presents substantial empirical support regarding the reliability and validity of the Self-Directed Professional Learning (SDPL) framework within the specific local context. Consequently, it contributes to our comprehension of the efficacy of instructional practices and educational processes in promoting independent learning among teachers engaged in ongoing professional development in Indonesia. Furthermore, this study has the potential to contribute to the advancement of local wisdom-based knowledge. The utilization of correct and reliable measures can effectively aid the examination of the factors that precede and follow autonomous learning.

Self-Directed Professional Learning (SDPL) is a significant aspect in the realm of professional development for teachers, enabling them to expand their knowledge base and enhance the overall quality of their learning experiences. Vocational school educators navigate within a multifaceted educational framework, wherein the ever-evolving technology advancements within the social milieu pose a perpetual challenge. The quality of classroom instruction, and its impact on learning outcomes, can play a significant role in driving educational transformation (Karlen et al., 2023). Self-directed learning, in its most expansive interpretation (Hatuye Helate et al., 2023), refers to a cognitive

process wherein individuals assume responsibility for their own learning endeavors (Teslo et al., 2023), either independently or with the guidance of educators, mentors, tutors, or peer groups (Magnusson et al., 2023). This process entails identifying learning gaps, formulating objectives, selecting and implementing suitable learning approaches, and evaluating outcomes (Alvarez Marinelli et al., 2023). As an educator in the field of vocational high schools, it is imperative to remain updated on contemporary knowledge, emerging trends, technological advancements pertaining to learning and scientific domains (Copur-Gencturk et al., 2024), as well as relevant scholarly and professional literature. This continuous engagement with current information is essential for effectively equipping students with the necessary skills and knowledge to navigate the ever-changing landscape of the workforce (Lee et al., 2020), which is characterized by volatility, uncertainty, complexity, and ambiguity (VUCA) (M. Wang & Zhang, 2023). The implementation of the Self-Directed Professional Learning (SDPL) approach enables educators to maintain adaptability and receptiveness to change while also ensuring that their abilities remain current in accordance (Njenga, 2023) with the requirements of the job market (Eßling et al., 2023). Additionally, SDPL contributes to the enhancement of teacher confidence and professionalism (Smedley, 2007). SDPL has been extensively utilized in undergraduate, Professional Teacher Education, and postgraduate programs through the implementation of learning contracts, problem-based packages, and distance learning packages. The recognition of helping teachers in directing their own learning effectively and developing their skills as facilitators is crucial for both pre-service and in-service teachers, necessitating the attention of school and government leaders.

According to Wiley (Wiley K, 1983), self-directed learning (SDL) refers to the extent to which an individual possesses the necessary attitudes, abilities, and personality traits required for engaging in independent learning (Alvarez Marinelli et al., 2023). Several assumptions concerning self-directed learning (SDL) are inherent in this description. Initially, it can be posited that adults possess an intrinsic inclination towards self-direction, indicating that the preparedness for self-directed learning (SDL) occurs on a spectrum and is inherent to varying degrees within each individual. The development of self-direction competencies can be achieved to a certain degree, and the most effective approach to acquiring autonomous conduct is through independent actions. The teacher competency model offers a comprehensive framework for integrating the factors that influence teacher practice (Abakah, 2023). The active generic model of teacher competence is a comprehensive framework that highlights the multidimensional nature of teacher competence. It underscores the significance of teachers possessing a deep understanding of the subject they are responsible for instructing, as well as the pedagogical strategies necessary to effectively convey that content. Additionally, this model recognizes the influence of teachers' views towards teaching and learning, as well as their personal motivations, in shaping their overall competence as educators. Teacher competence encompasses a range of essential attributes, including abilities, knowledge, beliefs, and motivating factors, which serve as the foundation for teachers to effectively navigate various professional scenarios. The concept of teacher competency is commonly perceived to be contingent

upon the unique setting and subject matter, as noted by Blomeke et al. (Blomeke et al., 2015). The Self-Directed Learning Readiness Scale (SDLRS), established by Guglielmino (Williamson, 2017), serves as a tool for assessing an individual's preparedness for engaging in self-directed learning. Self-directed learning skills have been found to be closely linked to lifelong learning, particularly in the acquisition of information and technological proficiency within specialized fields that are relevant to the job market. This has a significant impact on the evolving and dynamic demands of the labor market. It is imperative for educators, who are regarded as experts in the field of education, to continually enhance their knowledge and skills. This is essential in order to effectively meet the requirements of students and implement educational strategies aligned with predetermined objectives.

The concept of learning needs can be defined as a disparity or deficiency that exists between the intended degree of competence and the present state of ability exhibited by pupils (Khiat, 2015). Learning demands encompass not only the acquisition of competence but also stem from the pursuit of professional progress, hence constituting an unavoidable and ongoing process of learning. Therefore, the aspects of self-management, motivation for learning, and self-control can serve as foundational elements for assessing teachers' self-directed professional development, as outlined by Williamson in his work on measuring self-directed learning in adult education (Williamson, 2017). One of the primary conclusions drawn from the research undertaken by Knowles (Knowles, 1975) and Hiemstra (Hiemstra, 2001) is the imperative of determining the significance of organizational management structures in fostering self-directed professional development. Within the realm of human resource management in the field of education, it is incumbent upon school principals, who hold positions of leadership and wield significant influence and authority, to establish an organizational climate that fosters an environment wherein individuals are motivated to engage in self-directed learning as an integral component of their personal and professional growth. Furthermore, it is imperative for leaders to offer pertinent training opportunities in order to sustain and augment the knowledge and competencies of their subordinates, hence fostering the growth and advancement of not just their team members but also other individuals inside the organization (Karlen et al., 2023). Within the wider scope of professional practice, self-directed professional learning serves as a directive from the organization and a structure for professionals to actively pursue and disseminate their acquired knowledge and skills (Saleem et al., 2021).

The Self-Directed Learning Readiness Scale (SDLRS), established by Guglielmino (Williamson, 2017), serves as a tool for assessing an individual's preparedness for engaging in self-directed learning. Self-directed learning skills have a strong correlation with lifelong learning, particularly in the acquisition of information and technological proficiency within specialized domains relevant to the labor market. This has a significant impact on the evolving and dynamic demands of the job market. In order to meet the requirements of students and effectively implement educational practices, it is imperative for teachers, who are education professionals, to continually enhance their knowledge and abilities. This will enable them to align their

instructional approaches with the established educational objectives. This assertion is corroborated by the viewpoint expressed by Liu and Hallinger (S. Liu & Hallinger, 2018) who argue that self-directed learning plays a crucial role in the advancement of professionals as it enables them to enhance their knowledge and skills, hence fostering confidence in their practical endeavors.

The acquisition of knowledge is facilitated by an environment that provides support and encouragement. Barriers refer to several elements that hinder the initiation, progression, or completion of the learning process. These factors might impede or disrupt the acquisition of knowledge, skills, or understanding, leading to premature termination of the learning experience. According to Knowles (Knowles, 1975) and Hiemstra (Hiemstra, 2001), many elements such as age, culture, language, site design, gender, and motivation (particularly appreciation) have been identified as influential factors affecting resistance to self-directed learning. Furthermore, it is reasonable to hypothesize that several other factors, including temporal constraints, may exert an influence on individuals' inclination towards self-directed learning, such as their socio-economic standing. The impediment that teachers encounter in engaging in self-directed professional development pertains to the level of support provided by the work environment, which may potentially be of a structural type. The acquisition of knowledge and skills by teachers is constrained by various factors, such as schedules, school calendars, designated training periods, geographical distances between educational institutions and districts, as well as the accessibility of technological resources and other instructional tools. Budgetary constraints can have a limiting effect on teachers' capacity to engage in collaborative work beyond their classrooms since the allocation of resources may prioritize classroom-based instruction above training and professional development opportunities. Given these limitations, educators may have limited chances to cultivate the type of scholarly dialogue that enables them to critically reflect on their pedagogical practices in relation to educational objectives (Priestley, M., Biesta, G.J.J. & Robinson, 2015).

RESEARCH METHODS

Participant

Great attention was given to the careful selection of instructors from vocational high school schools as research participants, with the aim of ensuring that these schools closely reflected the wider sample of the survey to be subsequently conducted. A total of seventy educators specializing in vocational productive subjects were provided with a hyperlink to complete an online survey. A total of thirty teachers from vocational high schools were extended invitations to partake in the pilot project. The instructors are sourced from several vocational high schools, each specializing in diverse domains such as business management. The teachers who had previously participated in the pilot study were excluded from the subsequent large-scale poll. In the context of extensive surveys, the process of teacher selection commences with identifying the target demographic, which is subsequently followed by the determination of the reachable population. The reachable population refers to a subset of the target population that researchers are able to access and engage

with. The process of identifying target audiences and reachable populations is crucial in research as it enables the investigation of the presence of specific demographic groups in particular geographic locations (Schneider & Ingram, 1993). The participants selected for this study consisted of vocational high school teachers who matched specific research requirements. These criteria included being part of the reachable population, being productive subject teachers, possessing professional teacher credentials, and having vocational high school "A" accreditation. The individuals who satisfied these specific criteria constituted a sample that was drawn from the accessible population of 307 teacher. The age range of the participants spanned from 25 to 60 years. In Indonesia, it is a customary practice for teachers to retire and return to their residences upon reaching the age of 60.

Research Stages
First Step

The current phase involved the implementation of the SDPL scale for vocational teachers, which was derived from the SDL measurement scale developed by Guglielmino (Williamson, 2017). Adjustments were implemented based on an examination of the attributes of the research participants, with the subjects of this study being vocational high school teachers. The SDPL scale has been specifically designed to align with the specific attributes of the instructional practices employed by instructors in vocational high schools. Subsequently, the description of each scale is provided in Table 1. The provided description pertains to a literature study that has been tailored to the practical undertakings of instructors in Vocational High School settings. The SDPL scale for vocational high school teachers has seven distinct factors: self-management, desire for learning, self-control, usefulness, firm specification, spread of human capital strategy, and behavioral uncertainty control. These scales have been identified through a comprehensive literature analysis and extensive talks with experts in the field. The quantity of components on each scale ranges from four to six. Moreover, the development of written materials is grounded in theoretical research findings and has been tailored to suit the educational environment of vocational high school teachers.

The process of developing the SDPL scale was undertaken with the aim of establishing a reliable and valid measure for assessing vocational instructors' perception of their position as human capital within educational institutions and the broader societal context. Additionally, the scale was designed to serve as a tool for facilitating self-reflection among vocational teachers. The production of surveys typically adheres to a three-stage methodology. The initial phase of the study encompassed the identification and refinement of a measurement instrument derived from Williamson's work (Williamson, 2017) that pertains to the function of human capital in vocational high school teachers' professional development and learning (SDPL). This stage encompasses two distinct phases, namely doing a comprehensive literature analysis on teachers' self-directed professional learning (SDPL) and subsequently designing a continuous professional development program. The essential elements of the vocational high school instructors' Student Development and Performance Learning (SDPL) were identified. Furthermore, the identification and definition of

important scales or dimensions are established based on the literature review. This practice aids in the establishment of content validity by ensuring that the indicators utilized are grounded in a robust theoretical framework. The subsequent phase involves the composition of objects corresponding to each scale. The researchers conducted a thorough examination of the items derived from the previously constructed instruments. Subsequently, they carefully picked the most suitable instruments and made necessary modifications to align them with the specific research environment. Moreover, in the event that it is deemed required, supplementary elements may be included for each individual scale item. Subsequently, the experts proceeded to evaluate the items for each scale in terms of comprehensibility, lucidity, precision, and pertinence. Ultimately, the recently constructed instrument undergoes field testing in order to assess the validity, readability, and comprehensiveness of its items. Each participant provided their responses using a five-point Likert scale, ranging from "strongly disagree" to "strongly agree".

The Second Step

Subsequently, the experts proceeded to evaluate the items associated with each scale in terms of comprehensibility, lucidity, precision, and pertinence. This stage involves engaging in discourse, during which expert opinions are documented, and any errors or shortcomings in the items are addressed and reevaluated. During this phase, the experts also offered recommendations for enhancing the items, including the addition of content, as they perceived that the items did not sufficiently address the construct. Furthermore, they identified phrases that lacked clarity when interpreted by the teacher. This study utilized instructions from multiple sources in assembling things, including the works of Williamson (Williamson, 2017; Hinkin, T. R., Tracey, J. B., & Enz, 1997; Grosemans et al., 2020) a) the terminology utilized should be lucid and aligned with the attributes of the participant; b) befrain from using terminology that may elicit subjective interpretations; c) Each item should focus on a single topic and evaluate a specific action or answer; d) It is advisable for items to possess concrete meanings, as abstract concepts may present challenges in terms of interpretation and several possible understandings; e) It is imperative to refrain from posing questions that may contribute to the perpetuation of discrimination based on ethnicity, religion, or race among different groups; f) the respondent should possess familiarity with the anticipated language and information; g) It is advisable to refrain from asking sensitive questions or using double-negative phrase structures; h) responders should not associate the interval between questions with their previous answers. Based on the results of these reviews the scale and items were revised (see Table 1).

Table 1. Panel Expert Discussion

Panel Expert	Discussion
Prof. Dr. Waras, M.Pd.	The instrument is declared valid and can be used for vocational high school teachers. SDPL indicators correspond to the learning characteristics of vocational high school

Panel Expert	Discussion
	teachers in Indonesia
Prof. Dr. Sudjarwanto, M.Pd.	The SDPL scale is valid, indicators can be used as measurements that match both the theory and characteristics of the teacher. The scale and description of the instrument is appropriate and acceptable.

The Third Step

Instruments that have undergone the process of revision have recently been produced and subjected to field testing in order to assess the validity, readability, and comprehensiveness of the items. At the conclusion of this phase, the SDPL framework comprises three distinct scale: self-management, desire for learning, and self-control (see Table 2). The quantity of elements on each scale exhibits variation, specifically consisting of 11 items related to self-management, 9 items pertaining to a desire for learning, and 15 things associated with self-control. Each item was assessed using a five-point Likert scale, ranging from "strongly disagree" to "strongly agree", to measure the frequency of responses.

Table 2. Scale Item and Sample

Scale Name	No of Item	Description	Sample Item
Self-management	11	Teachers have the initiative to choose and manage study time and self-development related to their profession	I have a study plan for continuous professional development
Desire for learning	9	Teachers have the motivation to learn new things, even difficult things related to their field of expertise	I am open to new ideas in solving a problem
Self-control	15	The teacher has a responsibility and is able to evaluate the results of his learning	I am responsible for the actions and decisions I take

RESULTS AND DISCUSSION

The primary aim of this study was to create a standardized scale for measuring Self-Directed Professional Learning (SDPL) among vocational teachers. This purpose was pursued by assessing the validity and reliability of the developed instrument. The present study employs Structural Equation Modeling-Partial Least Square (SEM-PLS) as the chosen method for assessing validity and reliability. The analysis is conducted using SmartPLS version 3 software. The calculating stages involve the utilization of the Measurement

Model, often known as the Outer Model. The primary purpose of the outer model is to establish the association between the scale and the construct. A loading factor number exceeding 0.5 indicates a high level of validity. The further examination involves assessing the reliability of the constructs by considering the Composite Reliability (CR), Cronbach's Alpha (CA), and Average Variance Extracted (AVE) values. A construct is considered dependable if its CR value exceeds 0.7, CA value exceeds 0.7, and AVE value exceeds 0.5. The SDPL construct comprises indicators that will undergo validation through the use of seven scales and a total of 35 statement items. These scales encompass many dimensions, including self-management, desire for learning and self-control.

There are certain aspects that require attention, such as the documentation of activities and outcomes pertaining to ongoing professional development. This pertains to the evidence and efforts of teachers in the context of the School District Professional Learning (SDPL) initiatives that have been implemented by educators. Furthermore, the documenting of the learning outcomes implemented by the instructor serves as a valuable tool for evaluation and as a foundation for making informed decisions on future activities pertaining to SDPL. This policy is designed to exclude teachers from engaging in activities that are not directly aligned with their professional growth or career advancement. By utilizing paperwork, it is feasible to establish a correlation between the proficiency of educators and their professional advancement. Furthermore, it is vital for educators to enhance their self-assurance in acquiring knowledge autonomously inside the framework of Competency-Based Assessment (CBA). The primary source of motivation for an individual to engage in autonomous learning stems from their own intrinsic drive, which is often influenced by their professional obligations as an educator. Nevertheless, it is imperative for the presence of a school principal to foster teacher confidence in the learning process by providing excellent models that may be observed and emulated by teachers and staff members.

The factor exhibiting the lowest mean value is the dimension of specialized abilities (firm-specificity) in the statement, "I serve as a speaker/instructor/guide within my area of expertise." The research reveals that there is room for improvement in the teacher's function as a speaker, instructor, or resource person based on their level of competency. One indication of the effectiveness of SDPL is the ability of individuals, namely teachers, to acquire and demonstrate their competencies, thereby enabling them to serve as knowledgeable instructors in accordance with their learning outcomes (Smith, 2017). One particular type of learning that focuses on human capital is the acquisition of knowledge and competencies, which can enhance the overall quality of work. Teachers, being seen as human capital within Vocational High Schools, bear the responsibility of utilizing their competences as a means to enhance the overall quality of educational institutions. This can be observed by considering the application of the competencies possessed by individuals, which can enhance their overall performance. Furthermore, the presence of educators who implement pedagogical approaches focused on human capital development is a type of educational investment in teachers that is both

enduring and sustainable (X. Liu & Zhang, 2024), given that teachers themselves constitute a valuable asset for the nation (Demir, 2021).

Criterion of Validity

Validation and reliability analysis begins by looking at the outer loading of each statement item with SMART PLS version 3, Table 3 showed the results are obtained.

Table 3. Scale Item and Sample

Initial Item	Self-management	Desire for learning	Self-control
I have a study plan for continuing professional development (CPD)	0.800		
I document my CPD activities and results	0.800		
I do activities according to the time	0.870		
I have planned	0.582		
I carry out activities within the framework of CPD regularly	0.825		
I solve problems based on the plans	0.769		
I have created	0.729		
I put my work first	0.605		
I can be trusted to learn independently within a CPD framework	0.764		
I method	0.710		
I'm organized	0.788		
I need to learn new information		0.833	
I enjoy learning new information		0.764	
I am open to new ideas in solving a problem		0.797	
I like challenges		0.778	
I critically evaluate new ideas		0.717	
I like to gather facts before I make a decision		0.819	
I like to evaluate what I do		0.861	
I need to know why		0.742	
I learn from my mistakes		0.828	
I am responsible for the actions and decisions I make			0.461
I am aware of my limitations			0.845
I have high confidence in my abilities			0.818
I set myself learning goals within the CPD framework			0.827
I realize the need for information that is useful for me and my work			0.844

Initial Item	Self-management	Desire for learning	Self-control
I evaluate what I do			0.815
I am able to focus on a problem			0.682
I realize my own limitations			0.760
I control my life			0.700
I have high personal standards			0.762
I put on my own performance			0.800
I have high confidence in my abilities			0.743
I like to make decisions for myself			0.790
I am logical			0.799
I have high personal expectations			0.739
I prefer to set my own criteria to set my performance			0.812

Based on the external loading value (see Table 3) assigned to each statement item inside each scale, one item (specifically, "I am responsible for the actions and decisions I make") is deemed invalid due to its value above 0.5 (specifically, 0.461). Conversely, 35 items are deemed legitimate based on their item validity. The subsequent stage involves doing an examination of Construct Reliability. The purpose of Construct dependability is to assess the dependability of latent variables. A value is deemed credible if it exceeds the threshold of 0.70. The concept of construct reliability is synonymous with Cronbach's alpha.

In the realm of research, the dependability of indicators is deemed to be dependable when their values exceed 0.7, with all indicators surpassing the threshold of 0.8. The assessment of convergent validity for a construct using a reflective scale is determined by examining the Average Variance Extracted (AVE) values of all indicators, where a value greater than 0.5 indicates satisfactory convergent validity. This implies that the SDPL construct has the ability to account for an additional 50% of the variability observed in the items. Based on the available evidence, it can be inferred that the aforementioned 34 items possess the necessary qualities of validity and reliability, rendering them suitable for use as a Self-Directed Professional Learning (SDPL) scale. This scale may effectively gauge the level of SDPL among vocational teachers, particularly within the context of Indonesia.

An assessment of the scale's ability to accurately measure its underlying constructs can be derived from the Internal Consistency Reliability measure as proposed by Memon (Memon, 2021). The assessment of this phenomenon involves the utilization of composite reliability and Cronbach's alpha as measurement methods. According to Sarstedt et al. (Sarstedt et al., 2017), a composite reliability value ranging from 0.6 to 0.7 is often seen as indicative of good reliability. Additionally, Ghozali and Latan (Ghozali & Latan, 2015) suggest that a desirable Cronbach's alpha value should exceed 0.7. According to the data presented in Table 5, it is evident that all constructs exhibit Cronbach's Alpha values exceeding 0.6, with some even surpassing 0.7.

Consequently, it is reasonable to assert that all of these scales demonstrate a high level of reliability.

In order to mitigate any measurement issues, an examination of the unidimensionality test findings utilizing the composite reliability scale and Cronbach's alpha can be observed. The cut-off number for both of these scales is 0.7. According to the findings presented in Table 5, it can be observed that all constructs meet the criterion of unidimensionality, as indicated by the composite reliability value exceeding 0.7. Therefore, it may be concluded that all scales exhibit a high degree of reliability. Convergent validity is established by assessing the high correlation between measures of a construct, as stated by Ghozali and Latan (Ghozali & Latan, 2015). The assessment of convergent validity for a construct utilizing a reflective scale was conducted through the utilization of Average Variance Extracted (AVE). The AVE value must be greater than or equal to 0.5. According to Sarstedt et al. (Sarstedt et al., 2017), when the AVE value is equal to or above 0.5, it indicates that the construct has the ability to account for 50% or more of the variance in the items. The construct has successfully passed the convergent validity requirements as indicated by the Average Variance Extracted (AVE) values, which all exceed the threshold of 0.50. According to the analysis of the average variance extracted (AVE) values, the "desire for learning" scale exhibits the highest AVE value of 0.60, while the "self-control" scale has the lowest AVE value of 0.563.

Table 4. Discriminant Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Self-Management	0.885	0.889	0.911	0.597
Desire for learning	0.804	0.808	0.872	0.630
Self-Control	0.835	0.854	0.882	0.563

The government bears a significant responsibility in the advancement of vocational high schools in Indonesia, particularly in ensuring the continuous professional development of instructors. The role of vocational high school instructors holds significant importance in shaping the educational landscape of the nation. This suggests that the presence and proficiency of skilled and effective teachers will have a mutually reinforcing effect on achieving high-quality vocational education. In light of these requisitions, educators must possess the capacity to enhance their proficiency through the process of continuous learning (Wu & Li, 2023). One of the initiatives involves the teacher's capacity to engage in self-directed learning pertaining to their specific area of competence (Sajidan et al., 2017). Forming an informed judgment of a teacher's proficiency in implementing Student-Directed Project-Based Learning (SDPL) is a challenging task, despite the potential for achieving this through suitable measures. Therefore, it is crucial to ascertain the degree of the SDPL scale for the vocational high school teachers under development (Aleandri &

Refrigeri, 2014). In light of the aforementioned, the primary objective of this research endeavor was to construct a comprehensive measurement tool aimed at assessing the amount of self-directed professional learning (SDPL) among vocational educators. The development of the SDPL scale was facilitated by the implementation of a three-stage approach described in this work. Following an extensive literature review, as well as observations and interviews with many teachers, a series of statement items were constructed for the survey. Subsequently, the collection of items was validated by specialists, leading to the creation of an initial draft of the instrument. The initial draft underwent a thorough review process by specialists. Subsequently, the SDPL instrument was administered to a sample of 307 vocational teachers engaged in productive studies within the East Java Province of Indonesia. This administration of the instrument yielded additional data supporting its validity and reliability. The calculation of the validity and reliability of the attitude scale is performed. According to the SMART-PLS 3.0 output, the outcomes of the external loading analysis for each item reveal the presence of seven scales above the SDPL threshold, accounting for over 50% of the overall variance.

The primary objective of this study is to investigate and authenticate the SDPL scale's applicability in assessing the effectiveness of vocational teachers in productive subject areas. The validation and reliability of the assessment instrument encompassed a total of 35 items, which were organized into seven distinct scales. The research materials included in the study exhibit variations as they have been modified to align with Williamson's original research. Williamson's study encompasses five distinct scales. Nevertheless, a recent study conducted in Italy involved the administration of the original 2007 survey to both practitioners and students. This study utilized a total of eight scales, as reported by Behar-Horenstein et al. (Behar-Horenstein et al., 2018). The lack of stability exhibited by this scale indicates the necessity for additional investigation in order to evaluate the scale's stability across different professional cohorts and educational environments (Khiat, 2015; Knowles, 1975). Previous research has demonstrated that several contextual variables (Ha, 2022), including social environments, cultural influences, educational backgrounds, and prior experiences (Buchanan et al., 2022), exert an influence on learners' capacity (S. Liu & Yin, 2023) and inclination to engage in self-directed learning (Granziera et al., 2019; Teachers et al., 2021).

The potential influence of contextual factors on stability difficulties within different professional groups and learning environments is worth considering. Hence, additional investigation is required in this domain prior to the extensive use of the Williamson 2007 survey in professional educational settings. Acquiring a comprehensive understanding of subject matter is crucial in establishing teaching as a career (Brouhier et al., 2023). Effective teaching is contingent upon the instruction being delivered by educators who possess the requisite specialization in the subject matter (Barros et al., 2023). Furthermore, it is imperative to acknowledge that the enhancement of teaching and learning greatly relies on the subject knowledge had by teachers (N. Wang & An, 2023). However, it is worth noting that the focus on the growth and acquisition of this information has been lacking in organization. In essence, refrain from engaging in instructional practices without possessing a solid foundation of subject

matter expertise. It is imperative for educators to possess comprehensive knowledge pertaining to the subjects they teach in order to effectively access accurate information. Pre-service educators must also possess a conscientious understanding of their content knowledge (Wu & Li, 2023) and actively cultivate its ongoing development (X. Huang & Wang, 2021). The inclusion of the content knowledge factor in the development of this scale is believed to be significant due to a particular characteristic of content knowledge. The construct is effectively explained by the scale that possesses the lowest value, which is behavioral uncertainty control. This suggests that educators who possess the ability to identify the demands of their profession, actively pursue knowledge, and engage with the scholarly community beyond the confines of their educational institution are proficient and accomplished in implementing Self-Directed Professional Learning (SDPL).

Nevertheless, educators who possess the capacity to discern the demands of their vocation, actively pursue knowledge, and engage with the scholarly community beyond the confines of the educational institution do not necessarily guarantee exceptional teaching abilities. Teachers and aspiring educators must possess a comprehensive understanding of pedagogical techniques and instructional strategies. In order to effectively guide their students' learning outcomes, it is imperative for educators to possess a strong foundation of pedagogical knowledge (Lee et al., 2020). Similar to the importance of possessing topic knowledge (Nalbantoğlu & Bümen, 2024), it is imperative for prospective teachers to possess a comprehensive understanding of their professional development requirements and diligently fulfill them through the Structured Development and Professional Learning (SDPL) program. Educators possessing a profound understanding of self-directed and personalized learning (SDPL) possess the knowledge of how their instructional objectives will influence both their own growth and the acquisition of knowledge and skills by their students. Additionally, they foster the development of cognitive abilities and cultivate favorable attitudes toward the learning process. Therefore, the concept of Skills Development and Personal Learning (SDPL) necessitates a comprehensive comprehension of professional trajectories, prognostication of forthcoming proficiencies, advancements in technology, and their implications for students within educational settings (Lopes & Cunha, 2017).

The statistical data for the year 2021 highlights a number of pressing issues that require attention. Firstly, it reveals that a mere 22.3% of vocational teachers are effectively instructing within their respective areas of expertise, commonly referred to as "productive teachers." Secondly, the alignment and integration of vocational education in vocational high schools with industry needs, specifically regarding the linkage and matching with job market, remains unresolved. However, the implementation of Law number 23 of 2014 presents a number of significant challenges, one of which is the acquisition of qualified educators, particularly those with the necessary skill competencies required for effective teaching. Based on the aforementioned issues, it is evident that the cultivation of competent teachers in vocational high schools is a crucial factor that demands considerable attention to enhance their professional capabilities. This is because the presence of proficient teachers

plays a pivotal role in elevating the caliber and pertinence of vocational high school graduates. The President of the Republic of Indonesia has just issued Presidential Instruction number 9 of 2016, which aims to enhance the proficiency of vocational teachers and revitalize vocational high schools. The Presidential Instruction of the Republic of Indonesia Number 9 of 2016 clearly outlines the responsibilities assigned to the Ministry of Education and Culture. These include a) formulating a strategic plan for the advancement of vocational schools; b) refining and aligning the vocational high school's curriculum with the competencies required by potential employers; c) enhancing the number and expertise of vocational school educators and education personnel; d) fostering collaboration with relevant Ministries/Institutions, Regional Governments, and the business/industry sector; e) expanding the availability of vocational high schools graduate certification and vocational high schools accreditation; and f) establishing a dedicated working group for the development of vocational high schools. The development of vocational teachers, as highlighted in point c of the Presidential Instruction, is a crucial component that necessitates implementation.

CONCLUSION

This study examines the development and verification process of the SDPL scale, which is intended to assist vocational high school teachers in effectively implementing SDPL throughout their professional teaching careers. The Self-Diagnostic Professional Learning (SDPL) tool functions as an initial step for educators to assess and comprehend their learning requirements. Nevertheless, it is important to note that this instrument should not be solely relied upon as the sole means for educators to detect their deficiencies in self-study abilities. It is imperative for educational institutions to establish a comprehensive system for detecting and intervening in cases when instructors encounter challenges in implementing their Student Development and Personal Learning (SDPL) responsibilities. This network should be overseen by administrators, teachers, and professional communities, ensuring effective support for educators in need. The three scales, including 34 items in the SDPL, demonstrate homogeneity and can serve as a valuable and reliable instrument for assessing SDPL behavior among vocational teachers in productive academic disciplines. However, due to the fact that it does not identify the identical construct as the original Williamson SRSSDL, there may arise questions regarding stability. Additional research is needed before SDPL (Self-Directed Professional Learning) is widely implemented in education, especially among vocational instructors. Even though most of the SDPL item factor loadings had good internal consistency, the score obtained by the item "I am responsible for the actions and decisions I make" was declared invalid (0.461). One possible explanation for this is that teachers' professional self-development responsibilities are still low and are imposed as the school's responsibility. Another thing that triggers it can also come from time management between teaching hours and teacher training time. Compared with the Self-management indicator question item, the teacher's statement for the item "I have a study plan for continuous professional development (CPD)"

which has a validation score of 0.8, should be that responsibility for the plan made by the teacher is linearly proportional. These results appear to be also influenced by other variables that influence teachers in self-development. It is hoped that future.

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