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Developing Models for Measuring and Evaluating Success in Vocational and Professional Education and Training. An Empirical Study

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ABSTRACT: This study aimed to evaluate the performance of vocational high schools by developing and applying a comprehensive assessment instrument. The focus was on the actual processes occurring within these institutions, rather than solely relying on document-based evaluations. By analyzing factors affecting school performance, constructing a valid instrument, and conducting a thorough evaluation, the study found that the investigated vocational high schools demonstrated satisfactory performance in general management and academic management. Most of the evaluations of education, training and performance carried out in vocational high schools focus on documents or passive data, rather than on the processes taking place in the secondary schools themselves. Recognizing the need to study precisely these processes, this study focuses on the performance evaluation of secondary schools. The study begins with the identification of constructs and the development of instruments to assess the performance of vocational high schools. Based on the problems found in the field, before conducting the evaluation, the researcher must first develop the evaluation tool through three stages of development. The first one is to analyze the concepts related to evaluation by examining the factors affecting the performance of vocational high schools. In the second, instrument development and instrument analysis (content validation of selected criteria) are conducted with the help of experts. The third one, entailed a rigorous evaluation of the effectiveness of vocational secondary schools. Based on the evaluation findings, the investigated vocational high schools demonstrated commendable performance in both general management and academic management.

KEYWORDS: evaluation, secondary school performance, VET assessment models, vocational high schools.

INTRODUCTION

Education plays a pivotal role in individual and societal development. While the quality of education is often linked to cognitive outcomes, it also has broader implications for a nation's progress. In general, the cognitive aspect of the human being can improve due to the high quality of education received, although there is a number of conflicting studies related to this very claim. In a broader sense, education plays a specific role in the life of every nation and state. In the last report of OECD for PISA and VET it says, “Success in the world of work requires transversal competencies in addition to job-specific knowledge and skills.” (*OECD 2024: p18*).

If a student’s success is defined as acquired skills and competencies, engagement, as well as, health and well-being, it follows that measuring and evaluating success is closely linked to assessing student outcomes and academic performance. Vocational education is the focus of many people and institutions these days, and is a key component of the educational landscape, preparing individuals for the workforce. Evaluating the effectiveness of vocational high schools is essential to ensure they meet the needs of students and the labor market. In order to be able to understand to what extent vocational secondary schools fulfill their duties and functions, it is necessary to carry out an evaluation. It is also necessary to see if the current state and actual performance of the schools, including the principals, teachers, teaching staff, students, infrastructure and material base are in accordance with the regulatory framework and the requirements of the business environment - all this is key to the subsequent realization of students from these educational institutions in the labor market. A good set of tools is needed to get a good evaluation result.

Vanderburg et al. (2022) concluded in their report that while VET students demonstrated comparable or superior quantitative achievement to their peers, LSES VET students continued to encounter challenges in attaining the same level of academic success as non-LSES students, indicating that equity objectives in higher education remain unfulfilled and suggesting that equity goals in VET education remain elusive. This suggests that *socio-economic factors* significantly influence student outcomes in VET and subsequent transitions to higher education. *Ramasamy et al.* (2021) proposed a comprehensive framework for measuring quality

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within India's extensive VET system, one of the largest in the world. *Karstina, S., G. et al*. (2021) conducted research exploring the potential of cooperation as a means to enhance quality evaluation in vocational education and training (VET). *Oeben & Klumpp* (2021) report an analysis of measuring and evaluating success in VET, outlining group of success factors and hindrances associated with the radical and drastic transfer of an entire VET system from one country to another, like the example of Tunisia.

The instrument must represent a method that can measure a given object, where the results are close to the real state of the object. In order to obtain a good instrument, the factors affecting school performance must be analyzed in their entirety. Therefore, the principles of a good tool should be considered in the development process. Based on studies conducted in two qualified vocational high schools, the school performance was evaluated through some aspects, such as the accreditation of the curriculum/expert program, the performance of the principal and the performance of the certified teacher.

The teacher performance evaluation is called the post-certification evaluation for teachers. Based on information from the directors, this assessment is carried out only in a selected region in Bulgaria. None of the above evaluations focus on the activities of schools and institutions. From the information obtained in the initial survey using the evaluation tool, it was found that most evaluations conducted tended to focus on passive data. This means that they only focus on document analysis and not on process development. Therefore, an evaluation tool is needed that captures the efforts made by the schools to realize their vision and missions, taking into account that the vocational high school is an educational institution with many practical activities. Given the limitations of existing evaluation practices in Bulgaria, particularly the reliance on document-based assessments, the objectives of the current research are:

1. *Identify key constructs for designing a performance assessment tool* that effectively measures the activities and outcomes of vocational high schools.
2. *Develop and validate a content instrument* capable of assessing the performance of vocational high schools, focusing on their efforts to achieve their vision and missions.
3. *Evaluate the performance of two vocational high schools* in Sofia (vocational school of Construction, Architecture, and Geodesy; vocational school of Tourism) using the newly developed tool.

BASIC THEORETICAL FRAMEWORK AND CONCEPTUAL APPARATUS

Professional education

The term VET is interchangeable, synonymous with technical and VET. In general, it is an education that emphasizes the acquisition of knowledge, skills and attitudes (*Hristova et al. 2019*).

VET in one of the most developed countries, in the United States emerged in the early 1900s amidst debates about vocational training in public education. The general consensus raises the importance of vocational training as an alternative to the American academic tradition. However, there is a different perspective on some designs and implementation of public VET. Two figures, Charles Prosser and John Dewey argued that the established consensus did not align with the actual state of VET (*Kekkonen 1998*).

VET prepares individuals for careers in various fields, including commerce, arts, engineering, accounting, healthcare, medicine, architecture, and law. Unlike academic programs, VET often focuses on practical skills and knowledge related to specific professions or trades.

VET can be offered at different educational levels, from secondary schools to higher education. It can also be integrated into internship programs. At the post-secondary level, VET is frequently provided by technical institutes or universities, such as a polytechnic or university (*EC 2005; OECD 2024: p245*).

Vocational high school

The focus of this research is the evaluation of the performance of vocational high schools. However, since the scope formulated in this way is too broad, the study is limited so that the application is more targeted and thorough. Based on this stipulation above, the study focuses on the effectiveness of schools in organizing resources, namely time, place and human resources to provide good education to students. Effectiveness is shown by the school's performance, which is assessed both quantitatively and qualitatively based on the goals set by the school as an organization.

Vocational high schools provide VET at the secondary level. As explained above, they prepare students to work in various fields at the secondary level. In this way, they can produce personnel who are ready to work in business and industry.

Related to a school or institution, school performance assessment is a set of measures for different activities and values implemented in school (*Syarova 2017*). The results of the measurement are used as feedback that provides information about the individual

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achievements of the society of academics or groups within a school organization. In line with the aim of conducting school performance assessment, this study focuses on the assessment of school performance in preparing students for work in business and industrial fields.

METHODOLOGY

Research objective

This study aims to assess the technological and engineering characteristics of vocational high schools and begins with the development of assessment tools. The initial step is to develop an assessment tool using a research and development approach.
This action needs to be taken because of the goal of creating something that can be applied in the field being studied. The study adopts and modifies two developmental models from *van den Akker et al.* (2006) and *Gable and Wolff* (1993). There are **four stages** of instrument development – *conceptual analysis, construct identification, instrument development, and content validation.* After the tool was developed, it was used to evaluate the work of two vocational high schools in Sofia.

Sampling and data collection

The model is adapted to some components of VET – students, teachers and other school personnel who provide information about school outcomes. To validate the content of the tools, experts are invited to a focus group discussion. The sample sizes are as follows:

- ✓ experts – 13;
- ✓ teachers – 27;
- ✓ other school staff – 15;
- ✓ students – 303.

For the purposes of the study, the PG in construction, architecture and geodesy and the PG in tourism in Sofia were selected - the largest and most preferred by students vocational high schools in the capital. In addition, both schools have students, teachers, and staff eligible for analysis. Finally, in terms of distance, these schools can be visited by the researcher, so the process of data collection from these schools can be done easily and qualitatively.
The participants in the research from the vocational high school of construction, architecture and geodesy are 15 teachers, 10 lecturers and 153 students majoring in Geodesy, in the XI and XII grades. They were chosen because they participated in the field practice. Meanwhile, in vocational high school of Tourism, 12 teachers, 5 education staff and 150 students from the food and entertainment production technology program as they participated in internship programs.

Validation

Validity is determined using an expert model. It is an instrumental measurement such as a test or questionnaire that is valid and verified if the expert believes that the instrument can measure the mastery of the skill that is defined in the domain being measured. The present assay validation used the Aiken (1980) formula.
Aiken develops the formula V to calculate the content validity coefficient based on the result of the evaluation by the expert group of as many as n people to an item from the conditions of how well the item represents the measured parameter, as shown below:

$$V = \frac{\Sigma s}{n(c-1)}$$

where,
V = validity index
S = applied score, each rater reduced the low score in the category used (s=r–lo, r = rater's choice of score and lo = low score when categorizing the score)
N = number of raters
C = evaluation criterion number

Analyzing the data

In the conceptual analysis carried out in the first stage, the assessment tools were evaluated by teachers, school staff and students. The survey cards contain questions with four alternative answers arranged on a Likert scale. After identifying the construct and

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designing the instrument, the researcher conducted a focus group discussion. In this activity, the research team invites experts in educational evaluation and VET to get a good tool.

The techniques used to analyze the data obtained during the study are descriptive statistics. This analysis was used to obtain the performance level of vocational high schools. School performance is an accumulation of general and academic performance. The result distribution categories are presented below.

A = Very good (interval: $3.25 \leq X \leq 4.00$)
B = Good (interval: $2.50 \leq X < 3.25$)
C = Satisfactory (interval: $1.75 \leq X < 2.50$)
D = Poor (interval: $1.00 \leq X < 1.75$)
X = Mean value of the results obtained

RESEARCH RESULTS

The focus of the research is the assessment of work in vocational high schools, which begins with the development of a toolkit. There are three stages to designing the instruments. The first is a conceptual analysis that aims to examine the factors influencing the work of educational institutions. The result of the analysis served as the basis for developing the framework of the instrument. The second stage is content validation of the tools developed based on the plan. This stage is conducted with the support of experts as validators. The third is a performance evaluation of the performance of vocational high schools using the developed tools.

Conceptual analysis (first stage)

Research objective 1: Identifying constructs for performance assessment instrument design

At this stage, the researcher analyzes the concepts related to the research topics. Concepts explored are VET, school performance, evaluation of school performance, effective education, education for sustainable development, capability approach, entrepreneurship education and internships. Conceptual analysis is conducted to identify the factors influencing the performance of vocational high schools. References used to analyze the concepts are from scientific literature and regulatory documents, scientific articles and journals including e-books, from qualified publishers, namely *Syarova* (2017), *Hristova et al.*(2019), *Decision of the European Council* (2005), *EC* (2005.2006), *British council* (2011), *OECD* (2003), *World Bank* (2018) and the last report of *OECD* (2024) proposing a detailed framework of PISA for VET.

In addition, since the main topic of the study is instrument development, the researcher studies the concepts related to instrument development, for example, the method of instrument development, the concept of measurement, as well as validity and reliability.

Based on some considerations, the researcher adopted and modified two development models from van den Akker et al. (2006) and Gable and Wolff (1993). Based on the review of several references, the researcher is informed that school performance is affected by a number of factors. Thus, this study only focuses on things related to conditions and governance, which are then classified into two, general governance and academic governance. Aspects of both classifications are presented below (Aiken, 1980; BRITISH COUNCIL, 2011), achievements of general management include:

- ✓ leadership (A);
- ✓ participation of teachers and educational staff in decision-making (B);
- ✓ recording/documenting (C);
- ✓ progress monitoring (D);
- ✓ sequence of delegation of employees (D);
- ✓ overall staff development (E);
- ✓ recognition of the success of each member of the school (F);
- ✓ partnership management (H);
- ✓ student services (I);
- ✓ social climate management (J);
- ✓ facilities and infrastructure management (K).

Meanwhile, academic management achievements include:

- ✓ organization and implementation of the curriculum (1);
- ✓ the teacher's consistency in applying teaching approaches (2);

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- ✓ the application of good VET (3);
- ✓ fieldwork management (4);
- ✓ efficient allocation of study time (5);
- ✓ expectations for student achievement (6);
- ✓ routine assessment of student progress (7).

These constructs are validated by experts. The construct validation activity was carried out by applying focus group discussion. The areas of expertise envisaged for the focus group activities include:

- ✓ educational technologies;
- ✓ educational research and evaluation;
- ✓ educational sociology;
- ✓ assessment of professional education;
- ✓ measurement, research and educational assessment;
- ✓ philosophy and theory of VET;
- ✓ technology and VET;
- ✓ VET curriculum;
- ✓ professional education in construction, architecture and geodesy and tourism;
- ✓ learning in VET;
- ✓ management of VET.

Tool development (phase two)

Research objective 2: Develop the instrument and validate its content

Based on the results of the first stage by reviewing various references, the researcher obtains a construct of the work of educational institutions. These results are used as a basis for developing the framework of the instrument. Then, based on the developed plan, tools are developed, which are then validated by the experts. The construction of the instrument contains a plan that is developed and then the plan is used to develop questionnaires. A summary of the questionnaire and relevant data sources are presented in the table below:

Table 1 – Assessment aspects, groups of indicators and data sources (summary)

ASPECT	INDICATOR	DATA SOURCE/INDICATOR NUMBER		
		TEACHER	SCHOOL STAFF	STUDENT
GENERAL MANAGEMENT	1.LEADERSHIP	1-4	1-4	1-3
	1.TEACHER AND EDUCATIONAL STAFF PARTICIPATION IN DECISION MAKING	5	5	
	2.RECORDING/DOCUMENTING		6-8	
	3.MONITORING PROGRESS	6	9	
	4.SEQUENCE OF DELEGATION OF STAFF		10-11	
	5.COMPREHENSIVE STAFF DEVELOPMENT	7-8	12-13	
	6.RECOGNITION OF THE SUCCESS OF EACH MEMBER OF THE SCHOOL	9.26	14,20	4.24

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	7.PARTNERSHIP MANAGEMENT	10-12		5-6
	8.STUDENT SERVICES			11-13
	9.SOCIAL CLIMATE MANAGEMENT	15-17	15-17	14-15
	10.FACILITIES AND INFRASTRUCTURE MANAGEMENT		18-19	16
ACADEMIC MANAGEMENT	1.ORGANIZATION AND IMPLEMENTATION OF THE CURRICULUM	18-19		
	2.TEACHER'S CONSISTENCY IN APPLYING TEACHING APPROACHES	20-21		17-18
	3.APPLYING THE PRINCIPLES OF GOOD VET	13-14		19-21
	4.FIELD WORK MANAGEMENT			7-10
	5.EFFECTIVE DISTRIBUTION OF STUDY TIME			22-23
	6.STUDENT ACHIEVEMENT EXPECTATIONS	22-23		
	7.ROUTINE ASSESSMENT OF STUDENT PROGRESS	24-25		

Content analysis is a set of procedures performed by experts to review a construct. Experts review the tool plan, its content, and data sources for the tool. Based on the data obtained in this study, content analysis was performed using Aiken's method to obtain content validity. The approach taken in this step is the Delphi method. The number of experts participating in this series of Delphi activities was the same as the number of experts in the construct validation focus groups (13 experts).

The results show that all items in the developed instrument are valid. This means they meet the requirements for content validity. Based on the Aiken index criteria, the items are valid as they range from 0.67 to 0.87. Significance limits based on the number of raters according to Aiken (1980) as follows: a significance value of $p = 0.048$ requires the V index to be greater than 0.67, and for $p = 0.006$ it requires the V index to be greater than 0.75. The next stage is the preparation of the instrument based on the validated plan. The instrument developed is in the form of questionnaires and scoring guidelines. There are three sets of questionnaires designed according to the intended respondents namely teachers, school staff and students.

Evaluation of the effectiveness of vocational high schools (third stage)

Research objective 3: Conducting an effectiveness assessment in two vocational high schools in Sofia using the developed tool.

Once the performance assessment tools have been compiled and validated, the next step is to evaluate the curriculum in two different vocational high schools, namely the Sofia Vocational high school of Construction, Architecture and Geodesy (*VSCAG*) and the Vocational high school of in Tourism (*VSM*), again in Sofia. The evaluation results for them are as follows.

Data obtained from VSCAG.

The evaluation results, which focus on the general and academic aspect of management are presented in *Table 2.*

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Table 2. – Evaluation of the general and academic management of VSCAG

ASPECT	INDICATOR	POINTS			COLLECTION	ARITHMETIC AVERAGE
		TEACHERS	SCHOOL STAFF	STUDENTS		
GENERAL MANAGEMENT	1.LEADERSHIP	181	126	1274	1581	2,849
	2.TEACHER AND EDUCATIONAL STAFF PARTICIPATION IN DECISION MAKING	40	29		69	2,875
	3.RECORDING/DOCUMENTING		93		93	3.100
	4.MONITORING PROGRESS	43	31		74	3.083
	5.SEQUENCE OF DELEGATION OF STAFF		68		68	3,400
	6.COMPREHENSIVE STAFF DEVELOPMENT	94	55		149	3.104
	7.RECOGNITION OF THE SUCCESS OF EACH MEMBER OF THE SCHOOL	83	53	866	1002	2.831
	8.PARTNERSHIP MANAGEMENT	96		650	746	2.144
	9.STUDENT SERVICES			1221	1221	2,660
	10.SOCIAL CLIMATE MANAGEMENT	146	100	888	1134	3,000
	11.FACILITIES AND INFRASTRUCTURE MANAGEMENT		59	7123	7191	2.914
TOTAL POINTS FOR GENERAL MANAGEMENT ASPECT					13328	2.905
GENERAL CLASSIFICATION OF ASPECT GENERAL MANAGEMENT					GOOD	
ACADEMIC MANAGEMENT	1.ORGANIZATION AND IMPLEMENTATION OF THE CURRICULUM	80			80	2.857
	2.TEACHER'S CONSISTENCY IN APPLYING TEACHING APPROACHES	93		852	945	2,829
	3.APPLYING THE PRINCIPLES OF GOOD VET			1359	1359	2,961
	4.FIELD WORK MANAGEMENT	98		1877	1975	3.086
	5.EFFECTIVE DISTRIBUTION OF STUDY TIME			704	704	2.301
	6.STUDENT ACHIEVEMENT EXPECTATIONS	95			95	3.393
	7.ROUTINE ASSESSMENT OF STUDENT PROGRESS	97			97	3.464
	TOTAL MARKS ASPECT ACADEMIC MANAGEMENT				5255	2,984
OVERALL EVALUATION OF ACADEMIC MANAGEMENT ASPECT					GOOD	

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Table 2. shows that the general management of the VSCAG is considered "Good" - this indicates a mean score of 2.905. On further consideration, however, there are some aspects that need to be improved in terms of quality, namely partnership management and student services.

From the table above, it can be seen that in the aspect of academic management, the performance of the school is considered to be 'Good' - this is shown by the obtained value of 2.984. However, on closer inspection, it is clear that the fifth aspect, which is related to the distribution of training time, needs to be improved.

The following is a presentation of the results of the evaluations conducted at VST. The overall management results are shown in Table 3.

Table 3. – Evaluation of general and academic management of VST

ASPECT	INDICATOR	POINTS			COLLECTION	ARITHMETIC AVERAGE
		TEACHERS	SCHOOL STAFF	STUDENTS		
GENERAL MANAGEMENT	1.LEADERSHIP	159	70	1337	1566	3.023
	2. TEACHER AND EDUCATIONAL STAFF PARTICIPATION IN DECISION-MAKING	38	16		54	3.176
	3. RECORDING/DOCUMENTING		52		52	3.467
	4. MONITORING OF PROGRESS	37	19		56	3.294
	5. SEQUENCE OF DELEGATION OF STAFF		33		33	3,300
	6. COMPREHENSIVE STAFF DEVELOPMENT	85	33		118	3.471
	7. RECOGNITION OF THE SUCCESS OF EACH MEMBER OF THE SCHOOL	71	28	744	843	2.524
	8. PARTNERSHIP MANAGEMENT	62		598	660	1,964
	9. STUDENT SERVICES			1253	1253	2,784
	10. MANAGEMENT OF THE SOCIAL CLIMATE	120	54	825	999	2,846
	11. MANAGEMENT OF FACILITIES AND INFRASTRUCTURE		28	5435	5463	2.267
TOTAL POINTS FOR GENERAL MANAGEMENT ASPECT					11097	2,920
GENERAL CLASSIFICATION OF ASPECT GENERAL MANAGEMENT					GOOD	
ACADEMIC MANAGEMENT	2.ORGANIZATION AND IMPLEMENTATION OF THE CURRICULUM	71			71	2.958
	3.TEACHER'S CONSISTENCY IN APPLYING TEACHING APPROACHES	81		794	875	2.701
	4.APPLYING THE PRINCIPLES OF GOOD VET			1139	1139	2.531

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	5.FIELD WORK MANAGEMENT	86		1587	1673	2.681
	6.EFFECTIVE DISTRIBUTION OF STUDY TIME			653	653	2.177
	7.STUDENT ACHIEVEMENT EXPECTATIONS	79			79	3.292
	8.ROUTINE ASSESSMENT OF STUDENT PROGRESS	89			89	3.708
	TOTAL MARKS ASPECT ACADEMIC MANAGEMENT				4579	2,864
OVERALL EVALUATION OF ACADEMIC MANAGEMENT ASPECT					GOOD	

Table 3. above shows that the general management in VST is considered "Good". The average grade obtained in general management was 2.920. On further consideration, however, there are some aspects that need to be improved. They are partnership management, facilities and infrastructure management and recognition of the success of school members.
The performance of VST in terms of academic governance is also considered "good". This is evident from the score obtained (2.864). However, there are several aspects that need to be addressed, namely time allocation. There is a need for effective self-study time management when there are no school hours.

DISCUSSION

The constructs obtained in this study are summarized in two aspects, namely aspects of general managerial achievements and academic managerial achievements. Aspects of general management performance include eleven (11) indicators and academic management performance includes seven (7) indicators. This research activity creates tools to assess the performance of vocational secondary schools as follows:

- a tool for evaluating the performance of vocational high schools with a teacher respondent, a school staff respondent and a student respondent;
- guidelines for evaluating professional performance evaluation.

The specifications of the tools are as follows:

- a questionnaire with teacher respondents, consisting of 26 items;
- a questionnaire with respondents from educational staff, composed of 20 items;
- questionnaire with student respondents, consisting of 31 items.

All items in the instruments were categorized as valid with an Aiken V index between 0.67 and 0.87, which was assessed by 13 reviewers. Based on the results of the survey, the performance of two vocational schools in Sofia for general management achievements and academic management achievements is categorized as good. The general management achievement in VSCAG is 2.905 (on a scale of 4), while in VST it is 2.920 (on a scale of 4) and is categorized as good. The achievement of the academic leadership of the state vocational high school was scored 2.984 (on a scale of 4) and those at the private vocational school were scored 2.864 (on a scale of 4) and categorized as good.
The results of this study are related to the research of Syarova (2017), which revealed that the external quality of learning outcomes in VET by considering a broader approach is the perception and expectations of stakeholders. The findings of this study are also consistent with the findings of Hristova, Baev, Petrova, and Tosheva (2019), who revealed that aspects performed in implementation include design, implementation, and evaluation of professional development initiatives.

CONCLUSION

Based on the results of the research, it is necessary to work in several directions so that the instruments are qualitative and provide valid information related to the performance of vocational high schools. What needs to be done is to widen the range of trials to obtain different information about conditions in schools. In addition, it is necessary to prepare the conduct of the assessment more carefully - especially in the selection of respondents from the student component - so that students can fill in the questionnaires correctly.

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To enhance the quality and validity of the instrument for assessing vocational high school performance, several areas require attention:

1. **Expand the range of trials** to gather more diverse information about school conditions.
2. **Improve the respondent selection process** for the student component to ensure accurate questionnaire completion.

One limitation of this study was the validation of the VET effectiveness assessment tool using expert ratings. While this method provided valuable insights, the researcher believes that the results can serve as a basis for indicating the instrument's validity. However, the validity of the data collected depends on the objectivity and seriousness of the respondents. Additionally, the selection of student respondents was limited to those who had completed field placements, as this information was essential for the study. Selecting students who had not completed field placements would have compromised the validity of the data due to their inability to answer questions related to fieldwork practices.

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