Developing instrument to measure entrepreneur skills of vocational school students based on sustainable development

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Abstract. Entrepreneurial activities require a variety of skills. Instruments that measure the entrepreneurial skills of vocational school students are still very limited. This article aims to develop and validate instruments in measuring the entrepreneurial skills of vocational school students based on sustainable development. The research population was vocational school students in Klaten. Stratified cluster random sampling is used for sampling. The research method used is a quantitative method with an explanatory type of study that is directed to analyze and produce an instrument for assessing entrepreneurial skills. The item analysis to determine the criteria of internal consistency used Pearson Product Moment regarding data collected from one hundred and sixty students. The reliability of the instrument was determined using Cronbach's alpha coefficient. The criteria of internal consistency from each component is relatively high. The lowest average degree is 0.556 in the component view of independence, and the highest average level is 0.605 in the seeing opportunities component. The Cronbach’s alpha coefficient for the reliability test was 0.622 in the learning orientation component as the lowest degree and 0.819 in the result-oriented component as the highest degree. The results revealed that the entrepreneurial skills instrument is a valid and reliable tool for assessing the entrepreneurial skills of vocational school students.

1. Introduction
The main challenge for vocational school education is to make graduates ready to work in the business or industrial world. But the relevance between education and the workforce of graduates of these challenges is a serious problem. The data shows that the contributor to the unemployment rate is Javanese school graduates, namely 5.81% [1]. This condition is certainly not following the goals of entrepreneurship education, namely graduates who can open jobs for themselves and others [2]. The essence of entrepreneurship is the ability to create something new and innovative through creative thinking and acting to create opportunities [3],[4],[5],[6]. Entrepreneurship is affectionate with the creativity of new products, therefore to achieve entrepreneurial results it requires skills that can be developed through a training or educational process [7].

Lans [8] suggested the need to investigate more deeply about entrepreneurship education, where teachers are expected to create a competency-based curriculum and creative learning to support sustainable entrepreneurship learning. Several methods are applied for more optimistic purposes. Lee [9] psychological economics method instruction, providing an alternative explanation for the
phenomenon of entrepreneurship, Jones and England [10] also cultivate a mix of action orientations that encourage project-based learning. Problem-based learning methods can increase student motivation to answer more in a professional reality process [11]. The most frequently used methods are reading, class discussions, and business plans, using the case of prestigious entrepreneurs, and inviting local entrepreneurs to increase the knowledge of graduates about entrepreneurship and encourage them to become job seekers job-seekers [12].

The number of learning methods that are applied without neglecting the evaluation is carried out to see the level of achievement of the learning objectives. From a learning evaluation perspective, a reliable instrument to make indicators of when additional lessons are needed to better prepare teachers to teach entrepreneurial skills in managing students. The skill instrument in vocational schools is certainly different from education in higher education. Ismail and Zain [13] explain that it is necessary to develop instruments for entrepreneurial skills to obtain valid competency standards for entrepreneurial graduates. If this is not done, provided an evaluation of learning is not objective in measuring students' abilities. It depends on the subjectivity and ability of each teacher. As a result, the process of developing and improving entrepreneurial skills will be difficult to carry out, the goals of informing and creating new entrepreneurs are not achieved.

This study focuses on how to develop valid and reliable instruments to measure the entrepreneurial skills of vocational school students based on sustainable development. The development of the instrument went through three stages, namely content validation by experts, internal consistency testing, and reliability testing.

2. Literature review

2.1. Entrepreneur skills

The essence of entrepreneurship or entrepreneurship is a mindset, knowledge, and skills [14]. For this reason, entrepreneurship education (EE) is the cultivation of a mindset about entrepreneurship, knowledge of how to be entrepreneurial, and what skills you need to have to become a successful entrepreneur.

Entrepreneurship does not need to be studied or taught in education, entrepreneurial abilities will emerge and be tested when someone is directly involved in the world of entrepreneurship [15]. Some consider entrepreneurship as a talent with which one is born and cannot be taught; However, this can also be said about other professions, such as engineering or medicine, and no one will argue with the need to teach learners this subject [16].

On the other hand, someone who is equipped with entrepreneurial skills has a smaller risk of failure in entrepreneurship, or one's success in becoming a successful entrepreneur is influenced by the initial entrepreneurial ability. At the same time, there is a well-established recognition of the increasing demand for entrepreneurship education [17]. Many studies have proven that entrepreneurial skills can be trained and developed if prospective graduate entrepreneurs have attended and completed appropriate training and parenting programs [18].

Several experts have identified and measured entrepreneurial skills through several complex construct variables. [19] measures entrepreneurial skills using 8 constructs, including building networks (BN), risk-taking (RT), planning for the future (PF), results-oriented (RO), self-knowledge (SK), learning orientation (LO), independence (ID), and seeing opportunities (SO).

2.1.1. Building networks (BN)

Building relationships is at the core of successful entrepreneurship [19],[20]. Entrepreneurs need to be able to build relevant relationships and maintain relationships to recruit and retain clients [21],[22],[23]. Building relationships means the ability to nurture and build relationships (especially with people who have just met or met).
2.1.2. Risk-taking (RT)
The courage to take risks is an important asset for entrepreneurs to move forward [22],[25],[26]. Successful entrepreneurs can draw conclusions based on various sources of information and recommendations offered, for example by experts, consultants, colleagues, to advance the organization. They dare to make decisions, even when not everyone agrees with them and the results are completely unpredictable. Closely related to this is the ability to act independently of others.

2.1.3. Planning for the future (PF)
Successful entrepreneurs become and remain successful when they have the ability and want to continue learning to face new challenges such as technical and economic change and innovation. Orientation towards learning refers to the fact that successful entrepreneurs seek new knowledge and skills to develop themselves. It refers to participating in training and development activities, following up on new developments, knowing where to find relevant information, and being interested in new methods and techniques relevant to their profession [27],[28].

2.1.4. Results-oriented (RO)
Successful entrepreneurs are always results-oriented. They can measure the advantages and disadvantages of (financial) decisions and assess the factors that contribute to potential gains or losses [22]. Apart from identifying and assessing opportunities, risks, and returns, entrepreneurs can also make clear decisions.

2.1.5. Self-knowledge (SK)
Entrepreneurs are successful when they understand inner knowledge that allows them to identify weaknesses, prioritize which aspects need to be done by themselves and which ones need help from others [29].

2.1.6. Learning orientation (LO)
Successful entrepreneurs become and remain successful when they have the ability and want to continue learning to face new challenges such as technical and economic change and innovation. Orientation towards learning refers to the fact that successful entrepreneurs seek new knowledge and skills to develop themselves. It refers to participating in training and development activities, following up on new developments, knowing where to find relevant information, and being interested in new methods and techniques relevant to their profession [27],[28].

2.1.7. Independence (ID)
Independence refers to the ability to decide and determine for yourself what to do. It also requires belief in oneself and taking responsibility for one's actions [26],[30].

2.1.8. Seeing opportunities (SO)
Successful entrepreneurs have the ability to identify and take advantage of opportunities [22],[24],[25],[31],[32],[33].

2.2. Sustainable development
Sustainable Development in the world has begun to be applied to problem-based and project-based learning [34],[35],[36],[37]. Student learning shifts from passive (course instructors provide, students receive) to active (students provide, course instructors provide feedback), and students work on real-world problems by directly engaging in small group work or collaborating with stakeholders in developing solution options for identified problems. Specifically, [37] in their research categorize the implementation of sustainable development in learning as follows: (1) Perspective: defines contextual skills that must be directed within and in a wider environment, (2) Practice: experiential learning with linking back to real life, and (3) Personal: The personal and interpersonal skills needed to succeed in
sustainable projects, programs, and portfolios. The main factor for success in a learning strategy is a continuous reflection of experiences.

3. Method

3.1. Types of research
This research is a sequential mixed methods research study [38]. The qualitative early-stage data collection and analysis comes from the results of expert reviews of construct theory and the validity of the face of the instrument. The quantitative stage of data collection and analysis was carried out in the form of a survey study of vocational school students.

3.2. Respondent
Respondents in this study were one hundred and sixty vocational students recruited through sampling from three different vocational schools in Klaten, Jawa Tengah-Indonesia. Respondents were 84% male, and 16% female. All respondents use online media to support their learning both during class sessions and during independent learning at home.

3.3. Procedure
Respondents were given 47 items on the online entrepreneurial skills instrument trial using a computer that supports the web. The results of the revised instrument trial were then reviewed by three experts until they met the standards of the experts.

3.4. Analysis Technique
This study uses 3 types of analysis techniques, namely Face validity, Karl Pearson, and alpha Cronbach. Face validity was used to validate content by experts, Karl Pearson was used to validating item consistency and Cronbach's alpha was used to validate instrument reliability. The item analysis technique to determine internal consistency criteria [39] was carried out using Pearson's product-moment. Items with an internal consistency criterion value lower than 0.30 mean less consistency and should be excluded from the instrument. Reliability test using Alpha Cronbach [40]. An instrument is defined reliably if the reliability coefficient is 0.7 or more. All statistical tests were two-sided with a significance level of 0.05.

4. Result and discussion

4.1. Instrument development
The questionnaire was translated into Indonesian and checked for consistency of items by an expert. The questionnaire was developed based on existing sustainable development-based entrepreneurial skills constructs and was tested through a trial survey and the instrument was enhanced based on comments and feedback from the trial survey. This study uses a Rating scale with a value of 1 to 9. A scale of 9 indicates very skilled, while a scale of 1 indicates very unskilled. On this Rating scale, it is enough for the respondent to put a sign (√) in the space provided. The research instrument was adapted and modified from previous existing entrepreneurship measurement studies [19].

4.2. Measured validity
According to Allen and Yes [41], an instrument is called valid if it measures what it should be measured. Content relevance activities are a series of activities that take place after the initial form of the instrument has been written [42]. To assess whether the instrument has high content relevance, the instrument grid is examined whether it refers to the substance to be measured according to the construct by expert judgment. Furthermore, the expert assesses whether the test items that have been compiled are suitable or relevant to the specified grid classification.
After the establishment of the initial item set, five experts in measurement, curriculum, and literature on entrepreneurial skills individually reviewed all items. Experts agreed on the quality of 47 items, which were evaluated based on the clarity of language, relevance to the concept to be assessed, and uniqueness of the idea that the items presented were correlated with other items. This means that the instruments that have been prepared are declared valid by experts and can be maintained. 47 items maintain eight constructs of entrepreneurial skills, namely building networks, decisiveness, planning for the future, awareness of potential returns on investment, self-knowledge, orientation towards learning, independence, seeing opportunities.

4.3. Item analysis
The instrument made at the beginning of the research planning must be seen on the reliability of each item. Each item must support the construct [43]. This means that the faithful item must be positively correlated with the total score because the total score is considered to represent the construct. In other words, each item must be consistent with its total score. The internal consistency of each item is seen from the correlation between the scores of these items and the total score. The results of calculating the internal consistency index with the product-moment correlation formula from Karl Pearson are as shown in Table 1 and Figure 1:

![Figure 1. The criterion of internal consistency](image)

Grain consistency refers to the degree or degree which indicates how far the grain can measure consistently what should be measured. Each item in one construct must be correlated with other items. Hence, items intended to assess the same constructs yielded similar scores. In Figure 1 it can be seen that the results of the internal consistency of the items are not less than 0.3 or all items get results above 0.3. This means that high internal consistency results mean that the instrument can measure the indicators being measured.
In table 1 it can be seen that the BN1 to BN6 codes get an average of 0.604. This point is the internal consistency criteria of the Building Network construct. The DC1 to DC6 codes get an average of 0.559 which is the internal consistency criterion of the decisiveness construct. Codes PF1 to PF6 get an average of 0.667 which is the internal consistency criterion of planning for the future. The AP1 to AP4 codes get an average of 0.585 which is the internal consistency criterion of the construct of awareness of potential returns. SK1 to SK4 codes get an average of 0.575 which is the internal consistency of the self-knowledge construct. OTL1 to OTL6 codes obtained an average of 0.578 which is the Pearson correlation of the orientation towards learning construct. IP1 to IP6 codes get an average of 0.556 which is the Pearson correlation of the independence construct. Finally, codes SE1 to SE6 get an average of 0.605 which is the Pearson correlation of the seeing opportunities construct. Thus it can be identified that the seeing opportunities construct has the highest consistency in supporting entrepreneurial skills, while the independence construct has the lowest consistency in supporting entrepreneurial skills.
4.4. Reliability
Reliability refers to the consistency of measurement results if the measurement is repeated repeatedly on individuals or groups in a population [44]. The higher the degree of association between scores obtained through repeated measures, the more reliable the scale. In this study, the reliability test of each variable was measured using Cronbach's alpha. Cronbach's Alpha is a reliability measure that has values ranging from zero to one [45]. According to [46], the minimum reliability level of Cronbach's Alpha is 0.60. The value of Cronbach's Alpha reliability level can be shown in the following table (Table 2).

| Cronbach's Alpha Value | Reliability Level   |
|------------------------|---------------------|
| 0.0 - 0.20             | Less Reliable       |
| >0.20 – 0.40           | Somewhat Reliable   |
| >0.40 – 0.60           | Reliable enough     |
| >0.60 – 0.80           | Reliable            |
| >0.80 – 1.00           | Very Reliable       |

The Cronbach alpha coefficient generally increases as the correlation between items increases. Table 3 presents the results of the instrument reliability test. The results show that the instrument can be used to measure several of the same indicators. From table 3, it can be seen that the Cronbach alpha coefficient in each instrument construct is in the range of 0.622 to 0.819. All instrument constructs achieved a Cronbach alpha coefficient of greater than 0.60. Therefore it is categorized as reliable. BN and PF are categorized as very reliable because the gain coefficient is greater than 0.80.

| Instrument construct | Cronbach's alpha coefficient |
|----------------------|-----------------------------|
| BN                   | 0.819                       |
| RT                   | 0.689                       |
| PF                   | 0.800                       |
| RO                   | 0.695                       |
| SK                   | 0.622                       |
| LO                   | 0.699                       |
| ID                   | 0.751                       |
| SO                   | 0.717                       |

An instrument with high reliability means that the instrument will give the same results to a person's test results when measuring several times in different periods. When the instrument is used to test several people of the same ability level, it gives the same score. Reliable instruments will produce small measurement errors. So, a reliable instrument is an instrument with a small error rate. The high reliability of the instrument in this study means that this instrument is reliable enough to be used in the measurement. If the Cronbach Alpha reliability coefficient has been calculated, it is then compared with the Cronbach Alpha reliability coefficient criteria for a reliable instrument. According to Nunnally [47] states that the instrument is said to be reliable if the Cronbach's Alfa reliability coefficient is more than 0.70 (r ≥ 0.70) and Streiner [48] states that the Cronbach Alpha reliability coefficient cannot be more than 0.90 (r <0.9). If the Cronbach's alpha reliability coefficient is less than 0.70 (r <0.70), Tavakol and Dennick [49] suggest revising or eliminating item items that have a low correlation. An easy way to determine the item of the question is with the help of a program on the computer. If the Cronbach's alpha reliability coefficient is more than 0.90 (r ≥ 0.90), they also have a suggestion. They suggested reducing the number of questions with the same question criteria even though they were in different sentences.
4.5. Conclusion

One of the aims of this paper is to outline the instrument development process and its reliability validity. The instrument has an important position in research because the instrument plays a role in the data collection process. Valid and reliable instruments can also produce valid and reliable data so that they lead to conclusions that are following the actual situation.

Through a series of validations carried out by experts, the instruments that have been prepared are declared valid and can be maintained. The internal consistency criteria of each instrument construct were relatively high. It is concluded that each item compiled can measure consistently what should be measured, in this case measuring the entrepreneurial skills of vocational school students. With Cronbach's alpha coefficient between 0.60 - 0.90, it can be concluded that the instrument developed in this study has consistency for measuring entrepreneurial skills when used in different measurement times.

To determine whether the instrument is reliable or not, what is seen is the value of the reliability coefficient in terms of its usefulness, not whether the reliability coefficient is significant or not [43]. Even though the reliability coefficient is significant, if the values are small (close to the minimum value), then the reliability coefficient is not significant to describe whether the instrument is reliable or not. For that in the future in using this instrument, to obtain higher reliability results, it can reduce or improve items that have a small coefficient value.

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