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Article

Fostering innovation in the perspective of the independent curriculum of Boyolali regency

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Abstract: Innovation can be applied in every aspect of life. Similarly, innovation can support the implementation of an accountable education system and support regional competitiveness. Innovation is easy to echo, but difficult to implement. Especially with regard to the Education curriculum which is based on many teaching norms. For this reason, the independent curriculum is a bridge for students and teachers in pouring their innovative ideas through projects that link and match with the world of Education. The problem is that not all schools in Boyolali Regency dare to experiment. There are only 20 schools that seem to be making innovations from the total number of schools as many as ± 400 school units. Qualitative descriptive study method with analysis through problem trees. The result of the study is that an innovation model will be created three concepts, namely Training model, professional Development and Capability Development using problem-based learning methods, project-based learning and discovery learning.

Keywords: innovation; education; independent curriculum

1. Introduction

The phenomenon in Indonesia is still facing fantastic unemployment rates. In 2022 based on data from the Central Statistics Agency (BPS) shows that the number of unemployed people in Indonesia in February was 8.40 million people when a percentage of 5.83%. The distribution of unemployment rates by province also shows serious symptoms of handling. The unemployment is also dominated by the labor force aged 15 years and over.

Job limitations are almost experienced by every region in Indonesia. To overcome this, Indonesia has taken various major steps to become a middle-class country and continues to strive to become a developing high-income country by 2045 (Simamora, 2021). Recognizing the importance of job creation on this journey, Indonesia continues to be committed to creating strong job creation conditions. One is to build a workforce that has the skills necessary to secure middle-class jobs, including cognitive, interpersonal, and digital skills.

Alleviating unemployment is also an important task in the world of Education. Is there something wrong with the Education system in Indonesia? For this reason, the independent curriculum is present as a bridge to overcome the above problems. The independent curriculum is a curriculum with diverse intracurricular learning, which refers to the approach of talents and interests. This curriculum provides flexibility for

teachers to choose various teaching devices so that learning can be tailored to the learning needs and interests of students. Extracting student competencies is very dominant, so students will be easy to hone their abilities from an early age (**Table 1**).

Table 1. Open unemployment distribution 2021–2022. (Badan Pusat Statistik, 2023)

Province	Open Unemployment Rate by Province (Percent)					
	2021			2022		
	Februari	Agustus	Tahunan	Februari	Agustus	Tahunan
Aceh	6.30	6.30	-	5.97	6.17	-
Sumatera Utara	6.01	6.33	-	5.47	6.16	-
Sumatera Barat	6.67	6.52	-	6.17	6.28	-
Riau	4.96	4.42	-	4.4	4.37	-
Jambi	4.76	5.09	-	4.7	4.59	-
Sumatera Selatan	5.17	4.98	-	4.74	4.63	-
Bengkulu	3.72	3.65	-	3.39	3.59	-
Lampung	4.54	4.69	-	4.31	4.52	-
Kep. Bangka Belitung	5.04	5.03	-	4.18	4.77	-
Kep. Riau	10.12	9.91	-	8.02	8.23	-
Dki Jakarta	8.51	8.5	-	8.00	7.18	-
Jawa Barat	8.92	9.82	-	8.35	8.31	-
Jawa Tengah	5.96	5.95	-	5.75	5.57	-

Source: (Badan Pusat Statistik, 2023)

In terms of flexibility, this curriculum not only provides formal but informal education that is outside the routine of learning activities. Of course, the independent curriculum is very close to innovation. In the public sector, innovation focuses on the "improvement" component that arises from the change actions that are undertaken. Given the uncertainties and dangers involved, regional innovation should be flexible, and the effectiveness of innovation processes depends critically on the context of each region. Although the implementation of regional innovation is one of the responsibilities of Indonesian government agencies, along with the development of information systems and digitalization. Students will find it easier to innovate with project assignments applied in this curriculum. As is known, the application of innovation has been applied in various schools in Indonesia since the independent curriculum. Not only in the city center, the region as part of the Indonesian state, also advances innovation from an early age. Boyolali Regency intensifies innovation from beginner students from elementary, junior high to high school. Through the curriculum, the Pancasila Student Profile Project and the independent curriculum become a very important part in developing innovations made by students. The Merdeka curriculum consists of intracurricular activities, projects to strengthen the profile of Pancasila students, and extracurriculars. The independent curriculum is one of the curriculum changes in Indonesia carried out as a form of anticipation of the development and needs of the 21st century which is a form of improving the character-based curriculum as well as competence (Aprilia et al., 2022) Students are directed to the competencies and characters contained in the Pancasila student profile, it needs strengthening in

addition to intracurricular, extracurricular, and other programs (Retaduari, 2022). This section was developed by students to channel their ideas and creativity in implementing innovations in the completion of the Pancasila strengthening project.

Nugraha (2022) revealed that the changes that occur in the world of education can be seen from the emergence of various kinds of innovations both in terms of the education system, the implementation of learning, learning media, and matters related to the realm of education. Changes that occur in the curriculum, teachers must be able to adapt, starting from learning principles to the assessment process, as well as good cooperation between students, teachers, and parents so that curriculum implementation can run optimally (Megandarisari, 2021). Similarly, when students offer innovation ideas as the program progresses, it hints at a change in students' attitudes that begin to capture the courage to try to innovate.

Interestingly, this innovation is naturally developed by a student, the teacher only provides a project theme and students develop it themselves according to the availability of raw materials. Usually this is found in the Local Content Learning material in the Independent Curriculum which is achieved through: 1. Integrate local content into other subjects Education units and/or local governments can define Learning Outcomes (CP) for local content which can then be mapped to other subjects, school creations vary to determine local themes. 2. Integrating local content into the theme of the Pancasila student profile strengthening project Education units and/or local governments can integrate local content into the theme of the Pancasila student profile strengthening project. (3) Develop stand-alone local content specific subjects as part of an intracurricular program Education units and/or local governments may develop stand-alone local content specific subjects as part of an intracurricular program. The curriculum must be responsive and comprehensive in social life, not overloaded, relevant, and able to balance diversity and needs at all times (Julaeha, 2019). In addition, the curriculum must always be dynamic and always influenced by changes in the underlying factors (Yuliyanti, 2022)

The habit of students mapping problems in multiplying their innovation ideas, in curricular lessons is carried out in groups. Even students actively test innovations based on existing raw materials or rarely found today. The advantage of innovation is that students are creative for entrepreneurship and build a mentality not afraid to try new things. Post-pandemic learning recovery is something highlighted by the Ministry of Education and Culture and Technology because it is considered important. In this recovery process, the internet, big data, artificial intelligence, 5G, and cloud computing will have a lot to do with the implementation of post-pandemic education (Aoun, 2017; Zhu and Liu, 2020). This means that students use these supporting tools for the continuity of their learning. Although the limitations of laboratory equipment do not make students retreat from innovating, instead they use existing tools to support their innovation ideas.

The problem of this study is first, students only carry out innovations with perfunctory ideas that are considered to provide solutions to overcome their environment, second, students are still limited in competence to explore their innovation ideas in order to be able to do commercial business in the Pancasila strengthening project, third, students still need to introduce the environment, especially the advantages and availability of raw materials around them.

The purpose of this study is to create a model for the application of innovation in the independent curriculum carried out in elementary, junior high and high school/vocational schools. The point is that by identifying innovations developed by students will make the concept of a model for the application of innovation in an independent curriculum.

The novelty of this paper is the first independent curriculum to provide opportunities for innovation to students and students. Second, the independent curriculum increases student creativity to test their innovations. Third, the school's carrying capacity for innovation is increasingly visible when students succeed in providing the results of their innovation products. These four writings give readers knowledge to do the same thing that students have done.

One of the districts that is consistent in developing an independent curriculum is Boyolali Regency. The district spurred student creativity by mobilizing the curriculum in the form of an entrepreneurial framework. The concept of entrepreneurship in the independent curriculum turned out to be able to foster richer student interest with innovation experiments. According to Kamdi (2016) as written by Suryaman (2020) there are three orientations of higher education, namely training model, professional development model, and capability development model. The first and second models are very popular in industrial-style education that "exploits" human resources for the purpose of economic reproduction through education. Freedom to Learn wants material design and the provision of human resource competencies, methods, and facilities and infrastructure to be reorganized in order to face challenges so that they become opportunities (Efendi et al., 2022). The "Free Learning" policy towards ideal education, education that is ready to innovate and collaborate with various aspects. The state of the times is used as a land to innovate education starting from the learning system, skills and teacher teaching competencies. Collaboration with technology, virtual learning methods, and also artful teaching and learning strategies (Darise, 2021).

2. Methods

This study uses qualitative descriptive method. Descriptive qualitative is used to analyze, identify problems and determine solutions are performed using problem tree analysis. Problem tree analysis is a tool or technique commonly used during the planning phase to identify and analyze problems through a series of causal explanations of various interrelated factors (Hindri, 2019). This method helps to identify the cause of the problem and find alternative solutions.

Steps to create a Problem Tree: The first step is to identify and develop the main themes of the independent curriculum based on the analysis of available information. The second step is to analyze the impact of the main problem formulated in point 1. The third step is to analyze the root cause of the main problem. The causes at this stage are called first-degree causes. The fourth step is to further analyze the root cause of the first level of causes. The fifth step is to further analyze the causes of the appearance of second-degree causes. The sixth step is to build the entire problem tree. From the problem tree, it will be developed into an innovation model in the independent curriculum. When knowing the problem that occurs, you will also know the solution

to overcome it through the problem tree.

The informants in this study are students and teachers who concentrate on innovating. There are 5 students and 5 teachers as companions. The characteristics of informants are First, students who have innovation ideas and have conducted innovation trials. Both teachers are intense in accompanying innovation. The sample was selected by purposive sampling, where the author had known the previous characteristics of students who carried out innovation.

The limitation of this study is that it still discusses only one district as a case study. Second, the data collection time is short.

The results of the previous study of Darise (2021), which stated Collaboration with technology, virtual learning methods, and also artful teaching and learning strategies. In essence, it is necessary in this study the importance of technological touch in innovation. Evaluating the impact of innovation will provide concrete evidence of the impacts that are expected and that have occurred. The processing of innovation results is still simple with minimal knowledge, innovation can be developed properly if technology is the main thing in processing innovation. Students are easy to process innovations with limited knowledge that is only obtained from teacher assistance. Therefore, the Darise study is very appropriate to provide technology in every innovation processing.

3. Results and discussion

Boyolali Regency has 22 sub-districts with the number of elementary schools, junior high schools, high schools, vocational schools and universities spread across each sub-district (**Table 2**).

Table 2. Distribution of schools in Boyolali (Boyolali Regency Central Statistics Agency, 2023).

District	Primary school	Junior High School	High School	Vocational High School	College
Selo	10	3	-	1	-
Ampel	10	2	-	2	-
Gladagsari	10	4	2	1	1
Cepogo	15	6	3	1	-
Musuk	10	3	-	1	-
Tamansari	10	2	-	-	-
Boyolali	9	6	4	2	2
Mojosongo	13	4	-	1	-
Teras	13	3	2	2	-
Sawit	12	3	1	1	-
Banyudono	15	4	1	1	-
Sambi	16	8	2	3	-
Ngemplak	12	5	2	1	-
Nogosari	13	7	2	2	-
Simo	13	7	4	2	-
Karanggede	16	8	4	4	-
Klego	13	6	2	2	-

Table 2. (*Continued*).

District	Primary school	Junior High School	High School	Vocational High School	College
Andong	16	6	3	4	-
Kemusu	10	4	1	1	-
Wonosegoro	11	8	1	2	-
Wonosamudro	10	2	1	-	-
Juwangi	10	4	1	1	-
Total	267	105	36	35	3

Data Source: (Badan Pusat Statistik Kabupaten Boyolali, 2023).

Schools in Boyolali strive to foster innovation through the independent curriculum program. Based on existing data, only a few schools are able to encourage this to their students. The data is as following **Table 3**:

Table 3. Student innovation data in the independent curriculum. (Research and Development Agency of Boyolali Regency, 2022).

No.	School Name, District	Innovation Name	Forms of Innovation	Use of Local Raw Materials
1)	Public Junior High School (SMPN) 1 Kecamatan Banyudono	PAYABO (Puzzle Budaya Boyolali)—Boyolali Cultural Puzzle	Educational games or cultural puzzles	Local ingredients in the area
2)	Public vocational secondary schools (SMKN) 1 Boyolali	Pancuran Portable Ban Bekas—Used Tire Portable Shower	Utilization of Inorganic Waste	Landfills and workshops
3)	Public Junior High School (SMPN) 1 Boyolali	Indah Bersama Limbah—Beautiful with Waste	Waste utilization	Pampers and Sanitary Napkins Waste
4)	Public Senior High School (SMA N) 1 Nogosari	Cokijina (Cookies Biji Nangka)—(Jackfruit Seed Cookies)	Utilization of Jackfruit Seeds	Local Jackfruit seed ingredients
5)	Vocational secondary schools (SMK) An Nur Ampel Boyolali	Hand Sanitizer	Utilization of banana tree waste	Local ingredients in the area
6)	Vocational secondary schools (SMK) An Nur Ampel Boyolali	Biskuit Helbi	Utilization of vegetables such as carrots	Local ingredients in the area
7)	Public Junior High School (SMPN) 1 Teras	Nugget Jantung Pisang Sehat Aman Kekinian Halal—Healthy, Safe, Modern, Halal Banana Heart Nuggets	Utilization of Banana Heart	Local ingredients in the area
8)	Public Junior High School (SMPN) 1 Ampel	Corn Huks Burger	Utilization of corn petals	Local ingredients in the area
9)	Public Junior High School (SMPN) 1 Ngemplak	Hand Sanitizer Alami By Distillation—Natural Hand Sanitizer By Distillation	Utilization of Betel Leaves, Lemongrass and Lime Leaves	Local ingredients in the area
10)	Public Senior High School (SMA N) 1 boyolali	Food Tray from Husk	Use of paper waste	Local ingredients in the area
11)	Public Junior High School (SMPN) 2 Boyolali	The Dakers (Teh Herbal Daun Kersen)—(Kersen Leaf Herbal Tea)	Utilization of cherry leaf tea	Local ingredients in the area

Table 3. (*Continued*).

No.	School Name, District	Innovation Name	Forms of Innovation	Use of Local Raw Materials
12)	Public Junior High School (SMPN) 2 Boyolali	TADATIK (Tas dari Plastik)—Plastic Bag	Utilization of plastic waste	Local ingredients in the area
13)	Public Senior High School (SMA N) 2 Boyolali	SATUMIN (Sambal Tumpang Instan)—Instant Tumpang Chili Sauce	Utilization of local food sambal	Local ingredients in the area
14,	Public Junior High School (SMPN) 1 Teras	Safina Mutiara Sapepi (Safina Mutiara Sabun Pencuci Piring)—Safina Pearl Dishwashing Soap	Use of dish soap	Local ingredients in the area
15)	Public Senior High School (SMA N) 1 Banyudono	Kismud: Cookies Sehat With Whole Cow's Milk and Fennel Leaves—Healthy Cookies With Whole Cow's Milk and Fennel Leaves	Fennel Leaf Utilization	Local ingredients in the area
16)	Public Senior High School (SMA N) 1 Banyudono	Mielendung: Pemanfaatan Limbah Kulit Durian dan Kulit Kacang Tanah dalam Pembuatan Mie—Utilization of Durian Skin and Peanut Skin Waste in Making Noodles	Utilization of Durian Kulti and Peanut Shell Waste	Local ingredients in the area
17)	Madrasaha Ibtidaiyah Muahmmadiyah Bendo Kecamatan Nogosari	Appik (Alat pembuat Piring Pengganti Plastik) dengan Daun Jati—(Plastic Replacement Plate Making Tool) with Teak Leaves	Utilization of Teak Leaves	Local ingredients in the area
18)	Public Senior High School (SMA N) 1 Teras Boyolali	MIERANTE (Mie Tepung Porang dan Tepung Tempe)—(Porang Flour Noodles and Tempeh Flour)	Utilization of Porrang Tubers	Local ingredients in the area
19)	Public Senior High School (SMA N) 1 Teras	Cresle (Crackers Lele)—Catfish Crackers	Catfish Utilization	Local ingredients in the area
20)	Public Senior High School (SMA N) 1 Teras	KRIYA (Keripik Pepaya)—(Papaya Chips)	Papaya Fruit Utilization	Local ingredients in the area
21)	Public Senior High School (SMA N) 1 Wonosegoro	JEWEL'S (Aksesoris cantik Menarik dari Batu Kali)—Beautiful Attractive Accessories from River Stone	Stone Kali Utilization	Local ingredients in the area 90 %
22	Public Senior High School (SMA N) 1 Ampel	Platform Dezentje as a Historical Tourism Attraction at the Tomb Kerkhof Familiebegraafplaats Dezentje Desa Candi	Utilization of Kerkhof's tomb	Local Tourism Assets
23)	Public Senior High School (SMA N) 1 Ampel	Si Kunti Application As a medium for introducing cultural tourism at the Petirtaan Cabean Kunti complex	Heritage Event	Local Tourism Assets
24)	Public Senior High School (SMA N) 1 Ampel	Aplikasi Tamari in Mekarsari park—Tamari application in Mekarsari park	Introduction to travel through the application	Local Tourism Assets
25)	Public Senior High School (SMA N) 1 Andong	IMOT (infus monitoring)	Infusion creation	Local ingredients in the area
26)	Public Senior High School (SMA N) 1 Andong	Easy Farm (Monitoring Control System in Agriculture)	Control system	Local ingredients in the area

Table 3. (*Continued*).

No.	School Name, District	Innovation Name	Forms of Innovation	Use of Local Raw Materials
27)	Public Senior High School (SMA N) 1 Wonosegoro	Fluremask (Inovasi Masker Pereda Flu Beraroma Terapi)—Innovation of Aromatic Therapy Flu Relief Mask	Utilization of natural plants	Local ingredients in the area 90 %
28)	Public vocational secondary schools (SMKN) 1 Mojosongo	Averrose Tabir Surya with Natural Ingredients from Rose Flower Extract and Star Fruit Leaves Wuluh	Utilization of Roses and Star Fruit Leaves	Local ingredients in the area
29)	Public vocational secondary schools (SMKN) 1 Mojosongo	Musanitizer, Hand Sanitizer Aromaterapi from Kluthuk Banana Stem Extract	Utilization of Kluthuk Banana Stems	Local ingredients in the area
30)	Public vocational secondary schools (SMKN) 1 Mojosongo	Citrussoap, Sabun Cair Antiseptik dari Kulit Jeruk Purut—Antiseptic Liquid Soap from Kaffir Lime Peel	Utilization of kaffir lime peel leaves	Local ingredients in the area
31)	Public Senior High School (SMA N) 1 Wonosegoro	Pasgo Fresty 2 In 1	Making contemporary hijab styles	Local ingredients in the area 90 %
32)	Public Senior High School (SMA N) 1 Wonosegoro	Pada Plukan (Natural Instant Flavoring from the Leaves Ciplukan (Physalisminina) healthy and natural	Utilization of ciplukan plants	Local ingredients in the area 90 %
33)	Public Senior High School (SMA N) 1 Wonosegoro	J-PROS (Personal protective jacket with health protocol standards)	Application of the Jacket health model	Local ingredients in the area 90 %
34)	Public Senior High School (SMA N) 1 Wonosegoro	Wisboy (Historical Tourism android app)	Utilization of articulate storyline software	Local ingredients in the area 90 %
35)	Public Junior High School (SMPN) 2 Ngemplak	Utilization of Orange Peel Waste Substitute for Battery Stone Electrolyte (Dry element) is environmentally friendly	Utilization of orange peel	Local ingredients in the area 90 %
36)	Public Senior High School (SMA N) 3 Boyolali	BSG (Batako Serbuk gergaji-Sawdust Brick) Alternative utilization of Organic Waste	Utilization of chainsaw	Local ingredients in the area 90 %
37)	Public Senior High School (SMA N) 3 Boyolali	Batik Kombinasi Tulang- Bone Combination Batik D'BOG	Batik method of writing and stamping	Local ingredients in the area 90 %
38)	Public Senior High School (SMA N) 3 Boyolali	Air Quality Improvement through Extract Suplir With Media Disfuser	Utilization of essential oils and leaves of suplir plants	Local ingredients in the area 90 %
39)	Public Senior High School (SMA N) 3 Boyolali	Relipla (recycle Plastic Waste) as a basic material for wall decoration reliefs	Utilization of plastic waste	Local ingredients in the area 90 %
40)	Public Senior High School (SMA N) 3 Boyolali	Kobsu (Wingko Babat Susu)—Wingko Babat Milk	Utilization of cow's milk	Local ingredients in the area 90 %
41)	Public Junior High School (SMPN) 2 Ampel	Yoghurt Jamu—Herbal Yogurt	Utilization of herbal plants	Local ingredients in the area 90 %

Data Sources: Research and Development Agency of Boyolali Regency (2022).

The use of local raw materials attracts students to begin to instill a love for processing unused materials into multi-functional. The opportunities used by students

prove that students are able to maintain cultural values as an effort to maintain cultural heritage (Yunus, 2014). Some of the innovations created by students have also led to businesses such as handsanitizer innovations that have been marketed in collaboration with universities in packaging.

The innovation created by students is a driver of enthusiasm for interest in opening job opportunities as an effort to overcome open unemployment in Indonesia. When students feel the service that suits their needs, it will be able to encourage interest in learning from students (Tambunan, 2016). In his research, he explained that a teacher who knows the character of students by learning various learning strategies according to the needs of students can improve students' mathematical creative abilities. According to (Umdatul, 2021), explained that there was an increase in students' motivation scores after being given freedom treatment in choosing majors according to their interests and talents.

The implementation of an independent curriculum must certainly be supported by educational content (curriculum) which includes educational methods and tools in assisting learning and teaching activities carried out by students and educators. The focus of the Merdeka curriculum by paying attention to essential materials and projects can ease the learning load that must be taken by students. So that the achievement of a material can be pursued and explored with a flexible curriculum structure where there is integration in the use of projects in the learning process. According to (Sastrika et al., 2013), explained in his research that there are differences in critical thinking between students who follow the project-based learning model and the chemistry learning model. So it is necessary to continue the sustainability of project-based learning models in teaching and learning process activities for students. For this reason, it needs to be described in the curriculum to assist educators in its application, the independent curriculum provides an overview of the implementation of project-based learning with interesting themes that have been given by the education office to help education units explore more broadly according to the needs and developments that occur. In addition to project-based learning, the Independent Curriculum also focuses on providing essential material that is considered important material to be studied in depth (**Figure 1**).

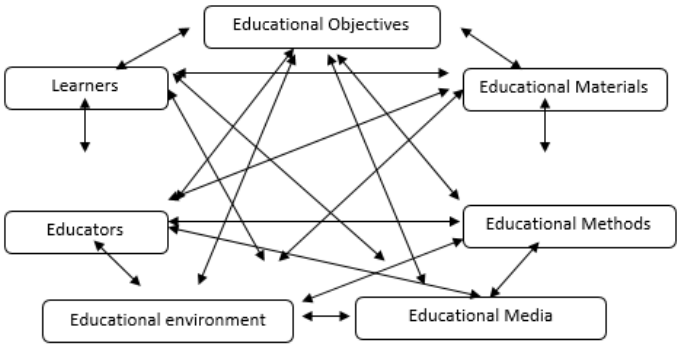

Figure 1. Learning system (Jojor and Sihotang, 2022).
Data Sources: Jojor and Sihotang, (2022).

The results of students' work in innovating become an interesting note that first, students become more open-minded to do the courage to try to innovate according to the theme given by the teacher. Second, the growth of entrepreneurial spirit in the soul

of students obtained from a series of activities throughout innovating. The three students are getting to know the environment, alleviating environmental problems is the most important part.

This study conducts problem mapping based on the problem tree that students have been facing in innovating. The first is monotonous learning where students have limited space to conduct innovation coaching clinics. Both students do not know their own competence, tend to expect too much from the teacher's direction without the determination to be the determinant of activities. Even though the learning system is optimal if there is an emotional connection between teachers and students.

Thus, the most important problem tree in overcoming crucial innovations in an independent curriculum system is (**Figure 2**):

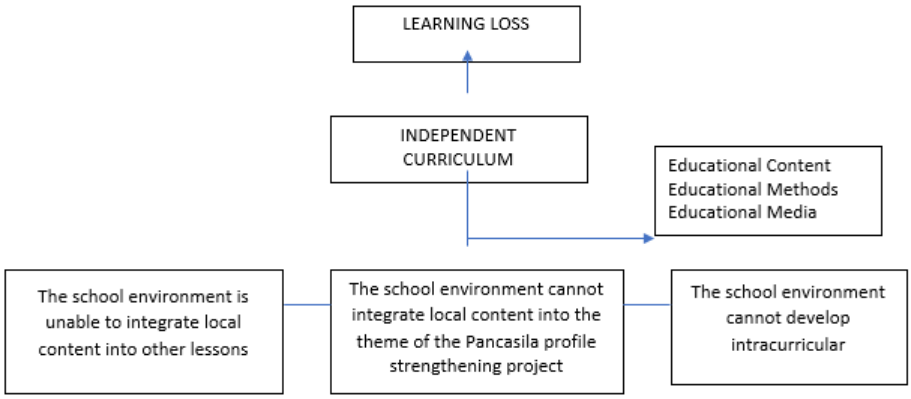

Figure 2. Independent curriculum system (Jojor and Sihotang, 2022).

After the problem tree is created, the problem tree targets as follows (**Figure 3**):

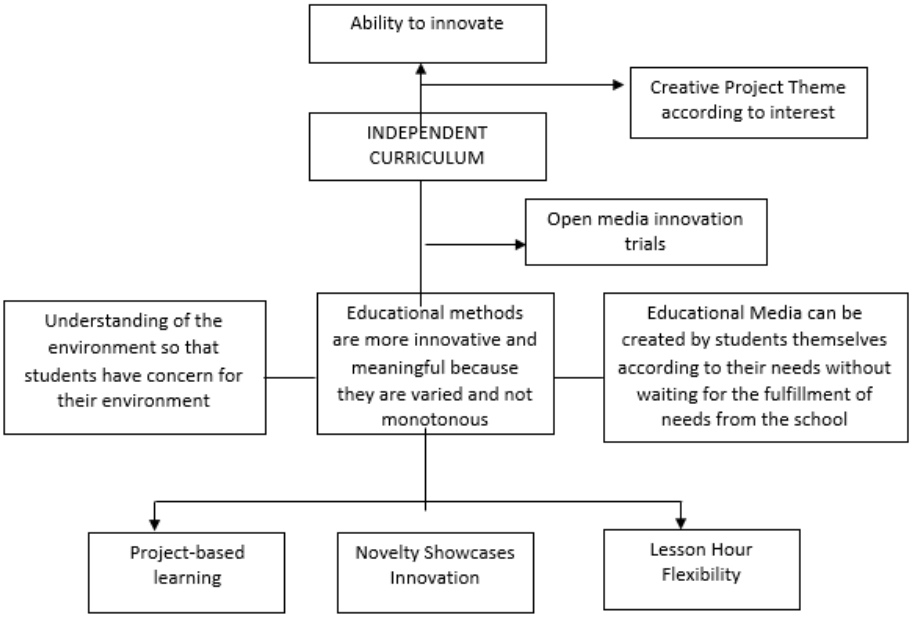

Figure 3. Problem tree targets (Jojor and Sihotang, 2022).

Student work in developing innovation is focused on three aspects, namely: Training model, professional development model, and capability development model. Training model AND Professional Development model is “exploiting” human

resources for the purpose of economic reproduction through Education. Capability development with the dominance of individual abilities in developing their potential. The orientation of education with the third model is the development of capabilities that go beyond competence. Setiawati's (2012) study states that capability consists of expertise and work skills, creativity and independence (**Figure 4**).

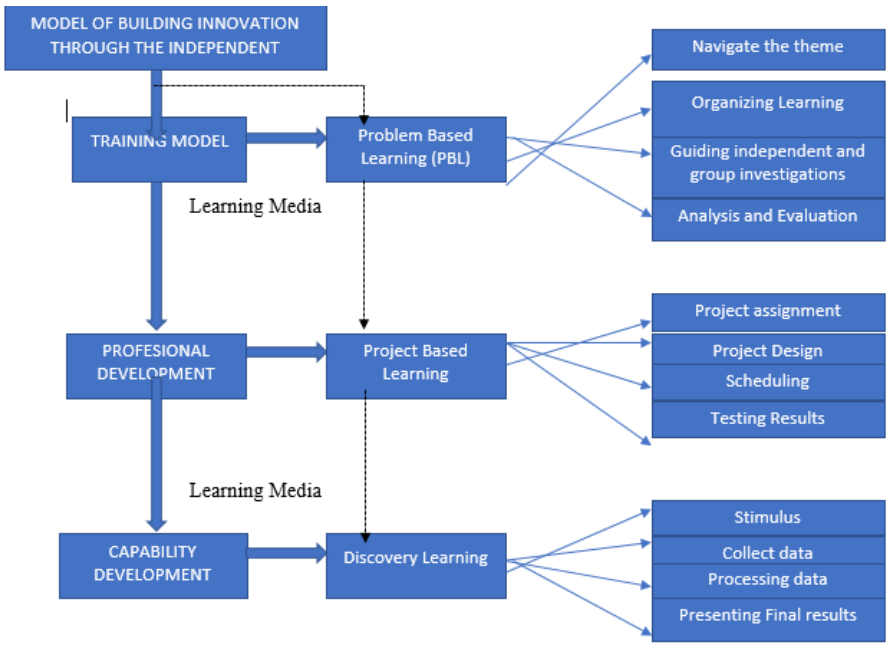

Figure 4. Orientation of education.

Source: Collection of theories processed by authors.

4. Conclusion

The implementation of the independent curriculum is a major part in arousing students' interest in innovating. The process that students go through is not easy, with the demands and guidance of accompanying teachers making the innovations developed by students more accommodated. The innovation model contained in the independent curriculum is passed in three stages, namely training model, professional development and capability development. These three models are the basis for determining learning methods for students. This research encountered various limitations, namely from the methodological aspect, the selection of micro-scale informants, the focus of research that only revealed one district. The suggestions that can be conveyed are: First, the school can develop students' potential by creating small clinics as a means of conducting innovation trials, Second, building an entrepreneurial mentality with the theme of projects for business profit, Third, creating a generation of nations for interest in opening jobs.

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