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Multimodal-Based Technopreneurship Learning Model to Increase Entrepreneurial Creativity in Equality Education

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Abstract

Background - Education plays a crucial role in improving a country's economy, particularly through entrepreneurship education. With rapid technological advancements, the traditional entrepreneurship model has evolved into technopreneurship, which focuses on digitalization and industrial transformation. However, many educational institutions lack a clear and adequate understanding of this concept, necessitating effective learning methods that enable students to grasp and apply the principles of technopreneurialism.
Research Urgency – The urgency of this research lies in the need to develop and apply a multimodal-based learning model that integrates text, visuals, audio, and interactive media to make technopreneurship learning more engaging and practical. Such a model is essential to empower equality education students—who often have limited exposure to technological learning resources—to cultivate entrepreneurial creativity, digital literacy, and confidence in producing innovative business ideas aligned with industry 4.0 demands.
Research Objectives - This study aims to analyze the effectiveness of a multimodal-based learning model in technopreneurship education to enhance entrepreneurial creativity among equality education students.
Research Method - The research employs a qualitative case study method. Data collection was carried out through observation, documentation, and interviews with 10 participants, consisting of students and teachers from an equality education school.
Research Findings - The findings indicate that the multimodal-based learning model successfully created a more interactive, communicative, and active learning environment. In the context of technopreneurship, this model was shown to increase students' confidence and communication skills, allowing them to engage in discussions and interact effectively.
Research Conclusion - Multimodal-based learning effectively enhances students' creativity and multimodal literacy, which has a positive impact on the innovation, development of ideas, and products with high commercial value. The curriculum for technology-based entrepreneurship education must continuously adapt to the needs of the business market to fully leverage this potential.
Research Novelty - The novelty of this research lies in the application of a multimodal-based learning model within the specific context of technopreneurship education in equality schools. This study demonstrates that this method not only improves technological literacy but also significantly boosts students' creativity and self-confidence in developing innovative business ideas.

***Keywords*:** Learning Model, Technopreneurship, Multimodal Learning, Entrepreneurial Creativity, Equality Education.

How to Cite:

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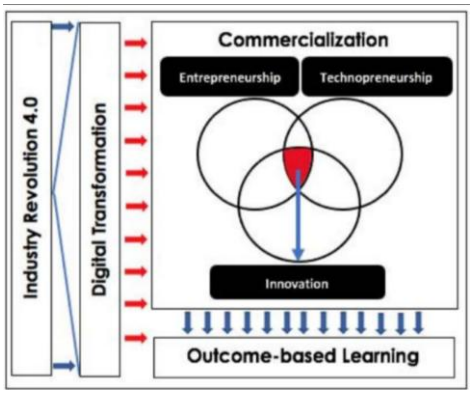
INTRODUCTION

Education plays a role in encouraging the progress of a country's economy. The world of education must be able to prepare people who have the competencies needed in the implementation of economic development. So, through education, it will give birth to human resources with all their abilities and competencies needed in the world of work and for the development of the nation's economy. Entrepreneurship is a learning process that is learned by involving interaction in it to seek profit. The purpose of the implementation of entrepreneurship education is aimed not only at encouraging the success of entrepreneurship programs, but also to help students with their diverse socioeconomic backgrounds to improve the level of family economy through entrepreneurship. Entrepreneurship education is able to be a major driver of sustainable economic development and facilitate students' entrepreneurial activities (Hidayat et al, 2018; He et al, 2019).

Technopreneurship is a new generation in the world of entrepreneurship offered to students with a background in the world of science in the digital era. The concept of technopreneurship is to produce entrepreneurs with knowledge, skills, and expertise in the field of technology. The goal is to expand opportunities, expand markets, and expand access to information. Technopreneurship involves people who are intelligent, creative and have an understanding of technology and have a passion for starting a business. Labor market conditions affect students' motivation to become entrepreneurs due to the high unemployment rate. Given that the global unemployment rate is increasing, students need to be equipped with technopreneurship skills that allow them to be able to create their own jobs. All educational institutions, both formal and non-formal, such as equality schools, both have an important role to develop entrepreneurial thinking and build an entrepreneurial mindset among students (Wong et al, 2020; Thomassen et al, 2020; Bomani et al, 2021).

Entrepreneurship is one of the career options that is increasingly in demand among students. An entrepreneur must have the ability to identify opportunities, create innovations from those opportunities and then build a business. For this reason, there is a real need to develop the mindset and ability of students who are able to be oriented towards the opportunities around them. Currently, the needs of the business market do not only require entrepreneurs who understand theory and practice, but also need the ability to master technology to compete in the modern business world or digital business. The business activities that operate today are growing in a technologically advanced environment (Tomy & Pardede, 2020)

Entrepreneurs with the ability to master digital technology will be superior when competing in the business world when compared to entrepreneurs who do not master digital technology. Companies that run a business but have not taken advantage of the use of technology are required to utilize computing technology in carrying out their business tasks, for example for advertising or accounting activities. Most educational institutions do not have a clear and adequate understanding of effective methodologies for developing entrepreneurship. Such basic knowledge must involve the role of academics, practitioners, businessmen and teachers who have sufficient competence in basic science in establishing and running a start-up (Bandera et al, 2018). To become a successful technopreneur, it takes leadership factors in innovating that emphasize critical to competition, performance management, and profitability. Therefore, leaders must be effective and ensure business sustainability to be able to create successful technopreneurs (Alkhoori et al, 2021).



(*Source*: Wong et al, 2020)

Figure 1. The Realtionship of Industrial Revolution, Digital Transformation, Entrepreneurship and Technopreneurship

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A technopreneur will start his business with an idea and identify his practices and systems using technology to create something different. The relationship between the industrial revolution, digital transformation, entrepreneurship and technopreneurship is described as follows figure 1. Based on figure 1, the industrial revolution caused a shift in the economic market. Therefore, the curriculum in the world of education is required to transform to be able to meet digital demands. Digital transformation involves digital changes in the company so that it will help companies to expand the contribution of the business that is run by revolutionizing the way of living, working and running a business. Technological advances have proven to be able to change the economy and the rules in running a business. The application of digital transformation in business can be a solution for the sustainability and expansion of the business from constant changes. Technopreneurship can be controlled and taught online. Technology and its applications can drive digital transformation, so it will have the opportunity to create new businesses and switch businesses from offline to online environments. Digital transformation will give rise to digital entrepreneurship as a new form of entrepreneurial activity (Wong et al, 2020; Rochanahastin, 2022; Jafari-Sadeghi et al, 2021).

Attention to technopreneurship is increasing in the world because it is considered a means to encourage innovation, develop new products and services and create new jobs in a conducive entrepreneurial ecosystem. Entrepreneurial innovation is facilitated by technological innovation, adoption and diffusion. Technology transfer is a form of innovation diffusion which includes dissemination and communication between technology providers, governments and technology users. Innovation in technopreneurship is very important. At the core of technopreneurship is the engine of innovation and technological advancement that is responsible for productivity and job growth (Naik et al, 2018; Amalia et al, 2020; Prisca & Onuoha, 2022).

Entrepreneurship and knowledge discovery are influenced by the learning process, so they can be used to facilitate improved performance of products, processes, or methods to develop new technopreneurship. The idea of technopreneurship was first initiated by Schumpeter as the ability to respond to increasingly creative changes. Technopreneurship has a contribution to economic and technological development. Technopreneurship can be understood as a person's capacity, competence and attitude to represent new ideas, technologies and inventions into an innovation that has commercial value. Technopreneurship is part of entrepreneurship whose goal is to commercialize innovations developed by academic scientists in the form of patents, licenses, start-ups, and others (Bhardwaj, 2021; Ndou et al, 2018). The development of technopreneurship in Indonesia urgently requires synergy and collaboration from academics, entrepreneurs and the government (Suryati et al, 2020).

Technopreneurship is composed of two words, namely technology and entrepreneurship which are briefly interpreted as the process of entrepreneurial development that utilizes the use of technology. Technology is a means to provide products needed for human survival and comfort and to improve the quality of results to be more efficient and effective. Meanwhile, entrepreneurship or entrepreneurship is an entrepreneurial activity or the process of individuals taking advantage of opportunities without looking at existing resources. Technopreneurship is the process of forming a new business by involving technology to create strategies and innovations to support national economic development. Technopreneurship combines technical knowledge and entrepreneurial skills, so that there is an application of science and innovative technical knowledge to create and lead a business. Technopreneurship is considered the best way to improve the standard of living and advance the nation's economy, especially the demands of technology in business. Technopreneurship is considered a prospective career option for students (Efendi et al, 2019; Saludung & Pramezwary, 2021; Bomani et al, 2021; Belmonte & Lira, 2023; Koe et al, 2021).

The focus of development of technology-based entrepreneurship education or technopreneurship is creativity and innovation that can create new perspectives that are more effective and efficient in knowledge-based economic development. To support the progress of the world of technopreneurship, the new paradigm of technopreneurship suggests collaborating with related parties to start and develop businesses to be more active, sparking creative ideas to support the technology industry to become more and more valuable. Businesses run by technopreneurs have the potential to create high growth, leverage of knowledge and foster high intellectual growth. In addition, technology and technopreneurship are able to increase the growth of start-ups (Hasanudin et al, 2021; Polyakov, 2021; Bomani et al., 2021; Hasanudin et al, 2021). On the other hand, technopreneurship can also be used to overcome problems expected by MSMEs, such as the provision of raw material supply (Nurkhayati et al, 2024). MSMEs are a force to form technology-based businesses or technopreneurship (Noersasongko et al, 2022; Wibowo et al, 2022).

Easy-to-get technology connects the younger generation to a virtual world dominated by multimedia and visual text. This situation was clearly seen when the Covid-19 pandemic hit the world, shifting all

activities, both work, study, and others to be carried out virtually by relying on technology. Therefore, educational institutions are also flocking to implement multimodal learning practices in the teaching and learning system. Multimodality describes a text that includes two or more modes of communication (semiotic capital), such as images, writing, speech, gestures and so on. Multimodality emerged and developed from Halliday's Communication Theory as an electrical approach. The multimodal approach combines the study of language with other branches of science, such as images, symbols, gestures, actions, and so on which are called semiotic sources in multimodal phenomena (Kim et al, 2021; Oleiwi et al, 2019; Aleem et al, 2021).

The breath of the definition of multimodal in learning with the limitations of multimodal learning studies encourages the formulation of appropriate multimodal theories to meet learning needs (Ilyas & Liu, 2020). Multimodal seen from Halliday's view is considered as social semiotics, namely forms of language that are social representations of the world. Language as social semiotics is interpreted to interpret language in a sociocultural context which is interpreted semiotically as an information system. Concretely, language does not contain sentences, but language contains text or discourse. Multimodal seeks to understand the different ways of representation of knowledge and the process of creating meaning, its focus is on the design of discourse with the contribution of semiotic sources (language, motion, images) disseminated in various modalities (audio, visual, physical), interaction and integration in the process of text coherence (Liang et al, 2024).

Visual images are very important in learning because they are related to the efficiency of teaching materials. Visual images help students recognize the context of the meaning of the text in the teaching text. Generally, images are used to support text, but in some cases images and text go hand in hand performing the same function and confirming each other. Fashion is a semiotic resource that is socially and culturally formed to create meaning. Using a single mode alone will not make sense to multimodal text. Thus, multimodality is associated with the conditions of using at least two input or output modes. However, each of the modalities such as text, images, video, and audio has a different level of effectiveness, so cross-modal retrieval must be carried out to determine the type of multimodal that can be used more effectively. According to the video it is considered one of the natural sources of multimodal data that can be used to interact (Sherwani & Mohammad, 2021; Kong, 2018; Hu et al, 2019; Akbari et al, 2021).

The modality describes how humans interact with their environment using human senses. The different modalities of human sensing will of course bring information with various perspectives that can complement each other to be able to obtain useful information. The multimodal approach uses text and image analysis (Man & Li, 2022; Radu et al, 2018; Cheng et al, 2019). Multimodality is reflected through complex and multi-layered two-way interactions and communication that affect the quality of collaborative learning. Different types of modalities can be used to understand the teacher's explanation and support, expand, and reinforce classroom learning. Multimodal interactions that occur normally can reinforce the construction of meaning and irrational multimodal interactions will reduce the overall meaning. The collection of several modalities can provide additional valuable informatics. Modality describes a combination or combination of two or more different modes. Modality and multimodality are then defined as a specific type of information or the result of a representation of information in a formation. A dataset has multimodal attributes when it contains many modes (Xu W et al, 2023; Alyousef, 2021; Ren, 2021; Tsai et al, 2019; Nan, 2022).

Multimodal and semantic modes provide opportunities to be able to use different modalities to represent students' circumstances and feelings which for example can be illustrated and represented by a person's involvement based on the presence or absence of speech. If a person makes a speech without greeting the other person which can be seen through eye contact or head pose, then the likelihood of the individual engaging in collaborative communication is very small. Multimodal perspectives and semantic modes in movement to express a meaning or word are done by identifying the movements that a person is making and translating them or relating them to the utterances that the person is likely to utter. To ensure the gestures seen with the possible utterances to be said, requires a semantic understanding of gestures (Worsley & Ochoa, 2020).

Multimodal discourse analysis (MDA) allows interactions involving at least two symbols to generate methods of communication of meaning such as images, music, and more (Purwaningtyas, 2020). As a multimodal discursive practice, communication occurs depending on visual structure, which means multimodality is responsible for reproducing the implications of ideologies, values, and contributing to the overall meaning. Multimodality deals with the decoding of different modes of communication to transmit multiple meanings. Communication will always be multimodal because it uses different semiotic resources simultaneously in the creation of meaning. The importance of multimodality arises due to the lack of focus of visual communication. Multimodal learning addresses the problem by adapting machine learning algorithms

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to learn from different modalities (Man & Li, 2022; Sherwani & Mohammad, 2021; Zadeh et al, 2019; Bhowmick et al, 2021).

Multimodal is closely related to literacy and literacy. The digital industry is beginning to change the focus of literacy programs from simple skills to increasingly developing with the involvement of the use of digital technology, so that it no longer relies only on traditional print literacy. The digital experience possessed by each student is very helpful in achieving the goals of the modern literacy curriculum because young people are able to use technology creatively and productively. The growth and development of the digital industry, one of which is in the fields of artificial intelligence, machine-based learning, and multimodal sensors, has begun to eliminate the boundary between humans and machines which is characterized by changes in the way of communication in working, playing and learning. Therefore, the approach to learning must also contribute to the learning experience for people with disabilities. One of them is done through Multi-CAD which is able to integrate speech, sight and recognition of movements, as well as natural language understanding. Through this multimodal technology, it can provide significant benefits for the general public in learning and expressing more creatively. Artificial intelligence to be able to make progress in understanding the world must be able to interpret and reason about multimodal messages (Yelland, 2018; Worsley et al, 2018; Baltrušaitis et al, 2018).

The sophistication of technology in the current era provides novelty in the field of education. Training and education are required to transform digitally. One of the learning approaches that provides new skills by providing opportunities for students to work together to solve complex problems in the learning environment and improve interaction more interactively with others. Students' increasing interest in entrepreneurship programs poses a challenge for teachers to design and create effective and meaningful learning strategies for students. According to his research, he argues that education for entrepreneurial careers requires a different approach that is able to encourage students not only to be able to evaluate business ideas in anticipation of exploitation opportunities, but more than just that so that in the research it provides ideas for learning models that can connect various elements implemented with web applications digitally (Spikol & Cukurova, 2019; Wu et al, 2018; Tomy & Pardede, 2020). The goal is to encourage students to be able to learn to identify the existence of resources and networks in a business. The use of technology and information in entrepreneurship can have a positive impact on company performance (Wu et al, 2018).

In the world of education, ICT is useful to help teachers in promoting learning and improving learning outcomes, especially at the elementary and secondary school levels. The application of information and communication technology in the world of education includes four stages, namely discovery, learning operations, understanding how and when to use, and specialization. However, choosing the right ICT tools to meet educational goals is not easy. A practical-based approach to technopreneurship learning that is innovative and focuses on inquiry-based, project-based and problem-based learning is expected to increase student engagement and independence in learning, so that students are more active in gathering knowledge, exploring and conducting their own experiments. The knowledge gap in the reciprocal relationship between scientists, technology, and the business sector in conceptualizing and commercializing business ideas is part of results-based learning (Wong et al, 2020; Spikol & Cukurova, 2019).

Multimodal-based learning methods have become one of the evidence of advances in the world of education that are able to explore the relationship between the sense of hearing and visuals to recognize speech or learning materials. Multimodal learning is an important topic in machine learning. Machine learning technology has been used to solve problems in the recognition of speech emotions, because humans express emotions through various modalities such as voice, facial expressions, and posture (Lee et al, 2019; Xu H et al, 2019).

The learning model that only explains theoretically with little practice is a monotonous learning model that causes many students to only have low ability in applying the concept of technopreneurship so that students will find it difficult to implement and build a business independently. A more effective way is needed to implement a learning model that comprehensively integrates mastery of theory and practice in a balanced manner. However, all of this is of course very difficult so it requires a more in-depth study. The emergence of collaborative learning models is in the background because technological developments are accelerating, so that it is able to create an entrepreneurial learning model based on information technology that can support success in learning technopreneurship (Reimon Batmetan et al, 2022).

Technological changes will not change the multimodal nature of communication. But what is different is the sociological interaction. Language is the dominant mode of communication in the learning system. Multimodal-based learning is defined as a student learning style in learning material through the use of a number of different sensory modalities. A teacher who implements a multimodal approach in his or her

classroom must be able to use more than one mode of communication to ensure that students in the class are able to understand and retain the information obtained. The technopreneurship learning model cannot be easily formulated and discovered, of course testing with a higher level of education is needed to ensure the success of the learning model to be applied. The learning model assisted by modules, textbooks and mentoring in creating technopreneurship products also requires an understanding of the cultural background that affects students' ability to master competencies, especially in learning that uses ICT devices. The innovation needed to answer all these problems is in the form of an appropriate ICT-based learning model with a simpler approach. The learning model that utilizes information and communication technology will encourage students to be more independent in creating business ideas and encourage the emergence of new start-ups in Indonesia (Sherwani & Mohammad, 2021). Innovation can be interpreted as all inventions that can be in the form of technologies, ideas, products that have been designed and have the potential to be commercialized.

The multimodal approach in the technopreneurship learning system is confirmed to be able to increase interaction and engagement between teachers, students, learning materials and topics, so that creative learning spaces can be realized. The application of multimodal-based learning in the classroom of course has its own challenges that must be faced by a teacher, especially to recognize, understand and appreciate the complexity of semiotic mode selection and student creativity. Most educators still do not master the expertise in implementing the concept of multimodal in the learning system, thus becoming an instructional challenge for the development and assessment of the educational curriculum. The findings of the study explain that multimodality is able to overcome problems related to different student learning preferences. This requires multimedia understanding and students' activeness in conveying messages well. Learning with multimodal sources offers the possibility of being able to capture the response between modalities and a deep understanding of natural phenomena . The fundamental challenge in multimodal-based learning is to represent compact variants and modalities that integrate various modalities without information labels and the challenge of translating data between modalities (Sherwani & Mohammad, 2021; Kim et al, 2021; Baltrušaitis et al, 2018; Suzuki & Matsuo, 2022).

METHODS

Research design

This study uses a qualitative approach with a case study design. This approach was chosen because the research aims to understand in depth the application of multimodal-based technopreneurship learning models in the context of equality education. The design of the case study allows the researcher to comprehensively explore the participants' experiences and interpret the meaning of the phenomena that occur during the learning process (Cleland et al, 2021).

Research participants

The research participants amounted to 10 people who were divided into two groups, namely 4 teachers who were directly involved in learning activities and 6 students as citizens studying in the equality education program. The selection of participants was carried out by purposive sampling technique, which is deliberately selected based on their active involvement in the multimodal technopreneurship learning process.

Data Collection Techniques

Data collection techniques are carried out through structured interviews, observations, and documentation. Structured interviews contain questions related to the use of multimedia in learning, the positive impact of the application of learning models, and the level of acceptance of students and teachers towards the multimodal approach (Adeoye-Olatunde & Olenik, 2021). Observations are carried out to see firsthand the interaction between teachers and students during learning activities, while documentation is used to collect supporting data in the form of activity notes, multimodal teaching materials, and student work.

Data Validity Data Analysis

To ensure the validity of the data, this study applied source triangulation by comparing information from teachers and students, as well as triangulation techniques by combining the results of interviews, observations, and documentation. In addition, member checks are also carried out by reconfirming research

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findings to participants, as well as observation diligence to ensure that the data obtained truly reflects field conditions.

The collected data was analyzed by thematic analysis through three main stages (Nicmanis, 2024). First, data reduction is carried out by selecting and focusing relevant data according to the research objectives. Second, data is presented in the form of narratives and themes to facilitate the extraction of meaning. Third, conclusions were drawn and verified repeatedly to find consistent patterns, relationships, and meanings related to the implementation of the multimodal-based technopreneurship learning model in equality education.

RESULTS AND DISCUSSION

This article seeks to explain how equality education students are able to increase their entrepreneurial creativity through multimodal-based technology entrepreneurship learning. Multimodal-based technology entrepreneurship learning is expected to be able to express innovation and creativity of new ideas born from young technology entrepreneurs. The findings of the study (Ndou et al., 2018) provide guidelines on the What, Why, When and How effective ways that are able to create a technopreneurship mindset through the determination of the type of content that suits the target group and appropriate learning strategies. The form of participation of equal educational institutions in increasing the progress of technopreneurship is carried out by encouraging students to design and develop innovations with technology, because the main goal of technopreneurship is the commercialization of an innovation that utilizes technology. According to research, the scientific learning method of technopreneurship is able to train students to be able to create products that suit the needs of the industry and at the same time foster students' entrepreneurial spirit and interest in seriousness. The technopreneur scientific model is a learning model that trains students to observe, try, communicate, and produce products that contain technological elements in both goods and services. The products created must have the potential to be commercialized and utilize technology, so that they can create business opportunities for students (Hidayat et al, 2018).

Multimodal learning uses various semiotic modes in forming a meaning. Not only limited to language, multimodal learning requires an interaction to represent a meaning. For example, gestures during a presentation can attract the audience's attention to focus on the presentation, making it easier to convey meaning. In addition, presentation slides accompanied by videos, images, and GIFs can also make it easier for the audience to capture the meaning of what is conveyed because they already have an image according to their own understanding. Youtube content or learning-based games can also be used to represent a multimodal-based learning model. The selection of content or teaching materials must be appropriate according to who the target is, so that the delivery of information can be done properly. Of course, all of that still requires good communication and interaction.

Multimodal learning media are available, diverse, and increasingly sophisticated such as Youtube, video-based presentations, audio and visual images, and games. The use of multimodal learning media in the technopreneurship learning process will make it easier for teachers to convey learning in different ways so that it is easier for students to understand and students will easily grasp the understanding conveyed by teachers. Access to learning media today is very easy due to technological developments, so that students and teachers can obtain information and access it more widely (Widodo et al, 2024). It is hoped that the use of learning media will be able to create more effective learning system innovations both for students and for teachers who deliver material. Information that is increasingly accessible very widely, of course, will increase student literacy and student creativity will increase because their imagination will be further developed. This is one of the achievements in the multimodal-based technopreneurship learning model in equality education. Students must be more creative to be able to compete in the world of digital business. Is this multimodal-based learning model effectively used in technopreneurship learning? It is quite effective, but there are still many things that must be reviewed so that the application of this multimodal-based learning model is more effective and efficient when used. Consideration of certain matters still needs to be thought about more carefully so that learning goals and outcomes can be met.

Is the multimodal-based technopreneurship learning model well accepted? Both students and teachers prefer multimodal-based learning models to traditional learning that tends to be boring. They agreed that in the multimodal learning model there is a lot of improvisation that can be done in the learning process, although at the beginning of the application of the model it was considered very difficult to continue. The proof is that until now multimodal learning has begun to develop, especially when the Covid-19 pandemic occurred. This

shows that the multimodal-based technopreneurship learning model is well accepted as a more interesting learning model. Some students answered that they could find their identity and were more interested in entering the world of tech entrepreneurship after they graduated. However, not all of them teachers master technology proficiently, so sometimes they have difficulty in providing teaching materials that are multimodal in nature.

Then can the multimodal-based technopreneurship learning model increase student creativity? Of course yes. Not only for students, but this is also felt by teachers. The creativity of each individual is different. Teachers are required to be creative in making teaching materials that utilize technology to look more attractive, simple, and can be easily understood by students. It is not easy for them, especially for teachers who are older. From the student side, they are increasingly challenged to be able to create products/services, innovations, ideas, or ideas that are still new in nature or developments from pre-existing ones that are collaborated with technology. These innovations are not only to be made as a new invention, but must have economic value and selling prices in the business market. One way to innovate is to apply the ATM method (observe, imitate, modify) that they get from one of the Entrepreneurship Youtube content. They also say they have to compete with increasingly sophisticated robots. For this reason, they must be more creative, able to see and take advantage of every opportunity that exists.

Students who are educated in multimodal contexts, both oral, aural, linguistic, visual and kinesthetic with print and digital resources are very important because these skills will facilitate students to think creatively, critically, collaboratively and communicatively. If students do not have multimodal literacy skills in running a business they have established, they will not be able to interact well, in the form of printed and digital texts. When students are able to communicate their opinions, then a teacher is needed who is able to combine educational strategies so that students have basic skills and are able to apply them appropriately and creatively in their daily lives.

Entrepreneurial learning is believed to be an important factor in forming entrepreneurial intentions because it allows students to be able to understand and manage the risk of failure in entrepreneurial activities (Shofwan et al, 2023). Technopreneurship-based learning is mostly applied to engineering majors. Entrepreneurial learning that integrates with technology is needed in today's era because all human activities can be done online. Technopreneurship learning can be done using a variety of methods, theories and models. There is a proposed model of entrepreneurship education which is divided into 3 stages, namely traditional methods, simulation of new business development, and participation in contests (Zhang et al, 2019; Jumini & Sutikno, 2019; Hashimi et al., 2021).

In general, technopreneurship is entrepreneurship, but it involves the use of technology to provide innovative hitech products. Innovation can be realized with the ability to make businesses more innovative with the involvement of appropriate information technology in it. In digital entrepreneurship operations, information and communication technology plays a major role as a facilitator (Suleiman, 2021; Machmud et al, 2022). Facilitating the operation of start-ups, mediators for new businesses, and providers of new digital business models. The concept of technopreneurship shifts entrepreneurship and is partly in the form of start-ups (Sahut et al, 2021). Technopreneurship leads to increasing economic efficiency, market innovation, job maintenance and job creation so that technopreneurship is the basis of entrepreneurship in the era of information and communication technology. The cycle of technological development can be used in the business world to create, produce, provide goods or services (Durmuşoğlu, 2018; Belmonte et al, 2022; Hameed & Irfan, 2019; Afraah et al, 2024).

The emergence of the concept of technopreneurship in the world of entrepreneurship is a challenge in the development of a learning curriculum in the school environment, one of which is in equality schools. Equality education providers must adjust the entrepreneurship learning curriculum in accordance with market needs. The traditional model in the learning system is dominated by teachers who deliver material to students in class, thus making students passive learners because they only listen and do the teacher's orders. However, nowadays technological advances have changed such learning models. The use of technology helps teachers to use a variety of multimedia resources that help them motivate students to develop skills (Susanti et al, 2021).

The multimodal conception in the learning system is strengthened by the two dimensions of multimodal literacy. First, the dimension of multimodal literacy as a medium related to the prevalence of multimodal texts provided by digital media to access and produce information. Multimodal literacy strongly recognizes semiotic resources and modalities in constructing meaning are very important, so multimodal literacy learners must be sensitive to the potential meaning and choices available in producing texts. Second,

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the multimodal literacy dimension as a multisemiotic experience that involves the introduction of multisemiotic and multimodal learning experiences. An example is reading humans through forms of expression, attitudes, gestures, and actions (Liang et al, 2024).

Teachers as actors in the learning system must be able to achieve learning goals. The challenge for teachers is, of course, related to the learning model that will be applied in learning so that students are able to understand and be able to implement the results in the world of technology entrepreneurship. Technology that is increasingly sophisticated and constantly evolving does not always have a negative impact on its users. The right use of technology will be able to produce innovations in creating diverse learning systems, one of which is by utilizing multimodal media in the learning system. The learning system should be a process of active student exploration and innovation, not a one-sided teaching of knowledge by teachers with passive acceptance by students (Han, 2022).

Multimodal-based technopreneurship learning applied to equality education is packaged to be more interactive and communicative, so that students are more actively involved compared to conventional or traditional learning models that only rely on teachers to read teaching materials to students. The multimodal-based learning model utilizes multimedia media in the learning process, such as presentation media, conference media, games, or can be through online platforms such as Youtube to support the technopreneurship learning process. The use of multimedia certainly describes the use of semiotic modes in communicating during the learning process, namely gestures, audio-visuals, visual images, and videos. Mastery of technology is the main achievement in learning technopreneurship, in addition to mastery of entrepreneurial concepts and the ability to apply.

The multimodal approach is closely related to multimodal texts that contain representational and interactive meanings. Multimodal is very important in the learning environment because the dominance of traditional learning practices is very superficial, very binding and even very boring. The emergence of multimodal-based learning has a positive impact, especially on students' language skills because they are more intense in communication and interaction between others. Students' increased ability to speak and communicate certainly has a good impact on the way they communicate about things together. A multimodal approach in learning technopreneurship will certainly have a good impact on students' motivation and intention to choose entrepreneurship as a path to a career in the future. This is the impact of well-established communication in classroom learning. Not only that, the positive impact of good communication will increase student confidence, so that students are able to explain their opinions in public. A multimodal learning environment that is very active and even exciting can give birth to ideas, thoughts, concepts and even innovations in the field of technopreneurship. Of course, technopreneurship students whose learning system applies basic multimodal will be more creative because they have the ability and skills to access, select, collect information and store it faster and easier. Multimodal-based learning is generally used to cultivate students' multimodal text analysis skills and train students' sensitivity in using multimodal resources to shape students' learning experiences in the classroom to be more interactive and communicative (Liang et al, 2024).

The development of digital technology has entered the world of education, one of which is marked by the fact that there are already several schools and educational centers that have decided to print books in an electronic format called e-books, so that they can be accessed anywhere and anytime. The electronic book includes representing the use of literacy in multimodal texts. The children's research findings argue that they think multimodal learning is the best learning approach because it can share their understanding of themselves and their world (Yelland, 2018). The use of technology as a supporting resource really helps learning to be more responsive and productive. Information technology is an important support in analyzing multimodal learning, because it is able to support complex performance measurement, large data storage facilities and intelligent data analysis. Learning methods that combine information from various modalities are able to produce stronger inferences (Muñoz et al, 2018; Liu et al, 2018).

The quality of educational outcomes in equality education is greatly influenced by the learning approach used. The balance between material mastery and technical knowledge must be balanced and this cannot happen without cooperation between educational institutions and industrial entrepreneurs. The teaching and learning process is considered to be two sides of the same coin. In the educational environment, not only in the formal education environment, but informal and non-formal education is also included in the equality education environment, where a teacher must be able to adjust and adjust to the way each student concentrates, absorbs, processes, and stores the information received. Therefore, if the learning system is adjusted to the learning style of students, then the learning outcomes are fulfilled (Suminar et al, 2025; Sherwani & Mohammad, 2021).

CONCLUSION

The conclusion that the multimodal-based technopreneurship learning model will increase the role of activeness, communication and interaction that occurs in the classroom. Well-established communication and interaction will improve students' speaking skills and literacy about the concept of technopreneurship. Therefore, students become more motivated and interested in choosing an entrepreneurial career for their future. Skills and abilities in understanding broad literacy will quickly create innovations, ideas, ideas, thoughts and so on in the field of technopreneurship so that students are more creative to be able to compete in the business market.

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