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Research Article

Characteristics and educational needs of gifted young scientists: a focus group study

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Abstract

The Gifted Young Scientists (GYS) is the students who have certain intellectual, creative, artistic, leadership, or academic abilities that are higher than the average ability of students in general, they need different educational services (special need). This study aims to analyze the potential of gifted young scientists in terms of critical thinking in the village area in Indonesia. The study was conducted using a multi-case multi-site case study design involving 4 managers, 5 teachers, and 5 students in the High School. Data collected through in depth and focus group interviews then analyzed qualitatively with thematically. The study found that there were four characteristics of gifted young scientists in the High School studied, namely; (i) very active and creative, (ii) easy and quick to receive information and materials, (iii) have a very high curiosity, (iv) love the high-level and challenging learning process. These findings indicate that the self-contained class students in high school meet the criteria of gifted young scientists. Thus, differentiated curriculum, high quality learning process with different teachers, materials, and approaches need to be designed seriously and continuously for the maximum student development process.

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Introduction

Gifted students are students who have above average intellectual intelligence (IQ > 130), unique behavior and high commitment, high understanding of abstract concept ideas, prominent in various fields of science, excellent ability to transfer learning to new situations (creativity), good self-perception and attitude, high self-motivation, and measurable goals, use high imagination in various academic activities, and be able to do problem solving in the analogy-construction transfer task (J. F, 1986; Renzulli, 1990; Cross, 1997; Renzulli, Smith, White, Callahan, & Hartman, R. K., Westberg, 1997; Arthington & Hartlepool, 2003; Altintas & Ozdemir, 2012; Betts & Neihart, 2017; Vogelaar & Resing, 2018). Gifted students also have a high emotional intelligence component (Cristian & Popovici, 2014).

To identify gifted students the role of the teacher in understanding the characteristics of student behavior is very important (Jo & Ku, 2011). The success of gifted students in developing their abilities is influenced by the interaction of students (Aydemir, Baykoc, & Uyaroglu, 2014), teachers, class, and parents (Godor & Szymanski, 2017a; Ayebo, 2016).

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Several studies have tried to exploit differences in parenting between gifted children, for example, the amount of service time and parenting education patterns provided at home and at school adjusted according to the needs of gifted students (Alberta, 2012). It turns out, the assumptions of the attitude of a teacher and also parents have a significant effect in achieving educational success for gifted students (Altun & Yazici, 2010). Teachers have to address the class in the frame of syllabus, these students learn very quickly, bored in a short time and their attention is distracted (Tantay & Kurt, 2014).

Gifted student learning refers to research that uses recycling gifted and talented students and Learning Styles Inventory (Al-Hadabi, 2010; Ugulu, 2015b). The process of transferring student potential does not only favor non-talents, but rather shows other superior abilities significantly (Vogelaar & Resing, 2018). Gifted students often have improper challenging opportunities when they are taught in regular classes. Intelligence and mental abilities are very important as a process of learning adaptation (Ishak, Abidin, & Bakar, 2014).

There is no significant difference in the learning process between gifted students and regular students in ordinary schools (Godor & Szymanski, 2017b). Whereas gifted and talented students need special learning and education curricula to support their development to the maximum (Pahrudin et al. 2020). Another thing that can be applied to meet the needs of gifted students is very important to do the mentorship learning system (Leroux, 1992; Wechsler & Feith, 2017).

An important aspect of learning by gifted students is regular learning style patterns with different dimensions and in a more comprehensive way (Idrus, 2013). So, it is necessary to change education to be more sensitive to gifted students through school curriculum reform based on student diversity (Dollarhide, 2013). The teachers emphasize that gifted students have different answers and their abilities are at the forefront (Karimi & Ali, 2010). These students were compared with other students in an analysis involving school motivation, academic self-concept, originality in thinking, and imagination (George, 2005).

The needs of gifted students are psychologically and socially a widely explored issue in the world of education (Coll, 2017). In addition, gifted students are generally associated with emotional instability that is reflected through behaviors such as oversensitivity, feelings of isolation, and perfectionism, due to unique self and environmental characteristics. The phenomenon that occurs, gifted student education is very little and less emphasis in terms of counseling services for developing student talent (Bakar & Ishak, 2010; Ugulu, 2015a).

With regard to the management of education for gifted students, efforts made in Africa are more directed at standardizing services and the ability of teachers towards the handling of gifted students (Ngara, 2017). This happened to the education system for gifted students in New Zealand and Saudi Arabia (Alghawi, 2017) which emphasizes services both physically (Gur, 2011) and psychologically (Hurford, 2013). However, the current psychological needs do not have provisions in the 1996 Malaysian Education Act. Education for gifted students in Thailand is carried out systemically which is based on aspects of student education in local wisdom (modernization) and education change (globalization) (Usane Anuruthwong, 2017). In Chinese education, the term gifted student refers to a linguistic context which means that gifted students are students who have special abilities to do something (Zhang, 2017). In the country of India, the conception of gifted students has focused on academic achievement and superior levels of intellectual ability, measured by IQ tests (Roy, 2017). The education of gifted students in Russia has regulations according to the applicable curriculum, such as the implementation of secondary classes namely programs that focus on academic development (Maskur et al. 2020) and soft skills (Grigorenko, 2017). Delivered in a study in Turkey said that gifted and talented students have three basic components, namely: practical ability, rational thinking, and leadership (Güçyeter, Kanlı, Özyaprak, & Leana-Taşçılar, 2017). Education for gifted students in Thailand is undergoing transformation as media and social technology develops (Usanee Anuruthwong, 2017).

In Indonesia there are acceleration and enrichment programs offered to talented students. This program includes curriculum enrichment and acceleration which is intended to accommodate learning and socially emotional. Therefore, we suspect that this research will be one of the references to find out how to improve and support the ability of gifted students.

Research Problem

In general, in disadvantaged areas such as villages, they have limited learning facilities. So to find out the potential of gifted students is very difficult to obtain (Akca, 2010). Some developed countries have implemented a system of quality distribution of schools, especially facilities. However, in developing countries like Indonesia, equity in the quality of schools in rural areas is still lacking. Therefore, a research is needed to find out the potential of gifted students in rural areas.

The background of the problem in this study is about "how to improve thinking skills, students who come from rural areas?". We know that, rural areas are areas that have less supportive education facilities such as internet-based learning media, ebooks, and printed books. Meanwhile, many famous researchers in the world who come from rural areas rather than big cities. Generally students from rural areas have high motivation to change lives. Therefore, we conduct research to find solutions or treatments that we must provide to improve thinking skills.

Method

Research Design

The study was conducted using qualitative methods (Obeng, 2016), with a multiple case multi site case study (Yin, 2013). Qualitative research and, in particular, focus-group interviews generate large amounts of data, which tend to overwhelm novice as well as experienced researchers. The interview in 1 hour could easily take 5–6 h to transcribe in full, leading to thirty to forty pages of transcripts. Thus, a central aim of data analysis, according to (Akubler, Erdik, Guney, Cimsitoglu, & Akubler, 2019), is to reduce data. (Habibi et al. 2019) points out that data analysis consists of a number of stages, i.e. examining, categorising and tabulating or otherwise recombining the evidence, in order to address the initial goal of a study.

Collected Data

Data was extracted from three main sources (triangulation) namely; superior class managers, superior class teachers, and superior class students through indepth and focus group interviews. Then analyzed qualitatively assisted software Nvivo 10.0. An overview of data sources is illustrated in Figure 1 below (Creswell, 2013).

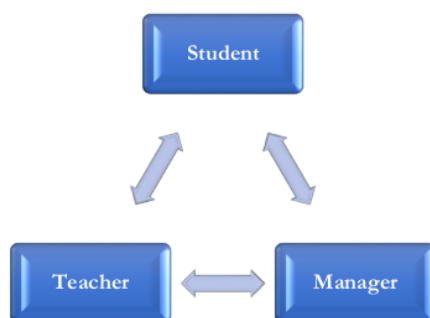


Figure 1.

Diagrams Refer to Research (Bogdan & Biklen, 2007)

Semi-structured Interview Form

This study uses two ways to obtain research data. The first is using focus group discussion (FGD) with a total of 10. questions or questionnaires. The second data is obtained based on students' scores obtained from the teacher's report.

Participants

Data collected through interviews (FGD) and In Dept. Participants in the data collection were carried out on 4 managers, 5 teachers, and 5 students in the Islamic School. The collected-data can be in the forms of poll results, stuffing and field notes on the instrument activity sheet in the state of implementation of lectures and learning which is used as a smooth in the process of planning, design, and development of course material collected by the techniques noted. The information of structures of participants can be see in the Table 1.

Table 1.

Structures of Participants

Source of Information	Number of participants	Average range	Women	Man
Managers of School	4	40 -45 years old	2	2
Teachers	5	35 - 43 years old	3	2
Students	5	16 - 18 years old	2	3

Data Analysis

In the previous research (Hartinah et al. 2019) build on this concept and suggest that the purpose should drive the analysis; they believe that 'analysis begins by going back to the intention of the study and survival requires a clear fix

on the purpose of the study'. Following this concept, although hard at times, is extremely helpful for managing the data, making sense of what is going on, getting rid of extra and irrelevant information and travelling safely through the maze of large and complicated paths of information.



Figure 2.

Focus Group in Circular Infographic

Results

Theme 1. Characteristics of Gifted Young Scientists

Based on the description of Figure 3 (Creswell, 2013) the results showed that the profile of gifted and talented students in Madrasas in Lampung Province included four components namely, (1) students have creative and active capacity, (2) gifted students have a very high sense of curiosity, (3) gifted students are more tested because they like challenges, and (4) students are more responsive and easily memorized. All of that was taken based on the triangulation analysis that researchers got from several sources, namely the Teacher, Student, and Superior Class Manager. It is said that gifted students have an attitude that tends to be active and creative, meaning that each child has the potential for giftedness or a combination of various skill fields which at the same time should get full support from the school, especially in the learning process (Huda et al. 2020). Creative thinking implemented in daily activities can stimulate alternative and innovative thinking in exploring learning material. Furthermore, gifted students have a high curiosity. In essence, students only want to find and look for something meaningful. Which in turn made him seem over-protective by asking questions that did not/did not exceed the limits because of his excessive interest in curiosity.

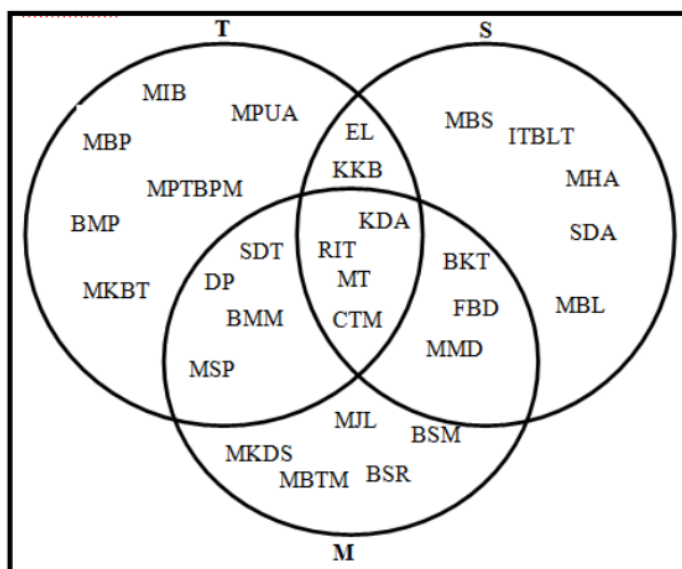


Figure 3.

Triangulation Data (Creswell, 2013)

ITBLT	: Ideas, Grammar, higher	BKTL	: Critical, Theoretical, and Logical Thinking
SDT	: High Discipline Attitude	MBT	: Able to Compete and Not Want to lose
MBS	: Loves Science	MK	
BSR	: Be polite and friendly	BMP	: Dare to Express Your Opinion
KDA	: Creative and Active	MBLT	: Liked the Higher Readings
MIB	: Have a Good Memory	MT	: From his age
RIT	: have Curiosity	ELT	: Liked the Challenge
KKBM	: Strong ability in Mathematics	MJL	: Expressively Oral and Written
MBP	: Asking Many Questions	FBD	: Having the Soul of Leadership
SDA	: Debate and Argumentative	BSM	: Focus on the Field of Interest
MPUA	: Express Unique and Original Opinion	MMD	: Think independently
MPTBP	: Consider an Unusual Approach to	MKBT	: Having Self-motivation
M	Problem Solving	MKDS	: Learning Motivation is very successful
DP	: Demonstrative and Prolific	B	
BMM	: Wise in Resolving Problems	MHA	: High
MSP	: Have Attitudes of Attention	CTMH	: Demonstrates Skills in Arts and Languages

The third explanation is about challenges. Gifted students prefer things that make themselves have a satisfied attitude towards something they want to achieve. This was revealed by his own statement in the following interview answer: "I prefer abstract things, because they are more challenging. For example, when the teacher tells me what it is like, which if it will not reach if imagined, it becomes something challenging to look for".

From the answers it appears that gifted students really like challenges. Whatever is the choice to explore its abilities, the efforts made must be maximized. The 4th component is about quickly absorbing what has been said. In psychology, gifted students have adequate intelligence. Where the brain is able to absorb the capacity of knowledge quickly assisted by neuron stimuli that directly stimulate the brain to think and act spontaneously. This is reflected in the behavior of students as explained by the teacher, "This excellent class student is quite enthusiastic when answering questions (Yasin et al. 2020). Even though the questions given were quite difficult. One of them is physics material. Every time I write down questions, or give questions verbally, students always scramble to answer them. Even

sometimes they are so quick to answer, they do not get markers, so I say "tomorrow learn to bring markers from home," said a physics teacher during an interview.

The explanation after careful examination, it was found that gifted students at present had the ability to quickly grasp and easily memorize and examine the theory swiftly and thoroughly. This underlies gifted students belonging to superior classes. The findings presented above are answers from source triangulation. Where, in fact each component that can be translated from data from several sources is presented in the following table 2:

Table 2.

Gifted Students Profile Matrix

Matrix Nodes	Focus Group	Individu
ELT	2	7
KKBM	2	7
SDT	2	5
BMM	2	5
DP	2	5
MSP	2	5
BKTL	2	6
FBD	2	6
MMD	2	6
KDA	3	9
RIT	3	9
CTMH	3	9
MT	3	9

The purpose of table 2 above is explained that the matrix of some of the results of triangulation of sources conducted with each of the 2-3 focus groups has an appropriate income and is based on the opinions of each individual. This happens because not all individuals express the same arguments or agree with what is carried out and observed when carrying out the process of learning activities and activities in gifted students or superior classes. The three venn diagrams that highlight similarities reflect agreement in accepting and meeting a point that can be used as research findings. In this way, the research obtained is a reference in the effort to see the profile of gifted students in Lampung Province Madrasas.

Theme 2. Educational Needs of Gifted Young Scientists

Gifted Young Scientists need to be supported with opportunities to find resources for their further research. If there is support for scientists to continue to develop science, then naturally Indonesia will develop into a large country in the field of science.

Through competitions that did not reach the age of the participants, the researchers provided the opportunity to obtain resource assistance for scientific research, so that they no longer needed to compare the scores needed with other countries.

In general, the selection, determination and development of learning method variables must be based on 4 important things, which are grouped into learning variables, namely (1) what objectives to be achieved, (2) what content must be sought to achieve the objectives, (3) what learning resources available, and (4) what are the characteristics of students. Without this footing, it is very small to develop optimal learning methods. With other considerations, the development of optimal learning methods must be preceded by learning needs analysis activities.⁸ There are several requirements that need to be learned by teachers in using various learning resources, including:

- Learning objectives should be used as a guide in choosing learning resources.
- The main points that explain the analysis of the content of the field of study to be presented to students. This needs to be done as a basis for selecting and utilizing learning resources so that the material presented through learning resources can clarify and enrich the contents of the material.
- The selection of learning delivery strategies that are appropriate to the source of learning. Strategy is very closely related to learning resources, in fact it is included in one type of learning resource.
- Learning resources that are designed in the form of learning media and written materials that are not designed.

- Timing in accordance with the broad subject matter that will be conveyed to students. The time needed to master the material will affect the learning resources used.

Discussion and Conclusion

From the results of the study, it appears that the teacher plays an important role in stimulating learning. In addition to being a facilitator in the classroom, the role of a teacher is also a major thing in an effort to deal with gifted students in evaluating and providing treatment to develop their abilities. Empathy and social skills are the right factors in building positive interpersonal relationships with students. This context of gifted students each program for empathic understanding among students will directly enhance leadership capabilities, ability to influence others, communication skills, collaboration or collaboration. Management for gifted students must focus on providing training in skills that are not strongly correlated with empathic understanding, that is, team abilities and catalysts for change.

In general, gifted students who are said to be intelligent have a good and polite attitude (Daud, Muhamad, & Yunus, 2018). In handling efforts, the importance of gifted students is placed in special classes with appropriate levels of learning and teachers. This is a form of anticipation of gifted students when treated in class interactions with peers at the same level of performance and becoming bored, frustrated, and unmotivated when placed in classrooms with low or average ability students (Fiedler, Lange & Winebrenner, 1993). It is important to focus on students' abilities and enable them to have a challenging curriculum (Renzulli & Reis, 2002).

One thing that can support the activities and creativity of gifted students is the condition of the environment where that potential can be realized. Even though the potential for giftedness (as a biological nature) is very important, but also environmentally important factors, namely family, playmates, and education at school. All of which will determine the success of a child achieving maximum achievement and being able to play in a conflict that is very detailed. Although naturally gifted students already have great brain patterns, the environment ultimately determines to what extent actualization takes place (Hertberg-Davis & Callahan, 2013). Talented students need something different, a commitment to provide appropriate curriculum and teaching, and teacher training in identification and appropriate educational strategies (Loveless, Farkas & Duffett, 2008). In addition, other data obtained by researchers based on the information of respondents with gifted student profiles include, the data obtained that the procession or gifted student selection system in the superior class is to have several stages, namely: (1) The average value of report cards > 80, (2) Oral test (3) written test. The informant illustrates that the process used is quite valid because the value used is the original value not a combination. Oral and written tests are used to test the ability of students to see how much ability they have.

The informant also explained that other programs that can support the development of gifted students' abilities are Foreign Language and Tahfidz learning where each agenda or event includes English-Arabic Area activities, the existence of story telling art performances, and reinforcement of memorization in order to practice their ability to remember and memorization, so that it refers to the development of entry-behavior by the gifted student. Although naturally gifted students already have great brain patterns, the environment ultimately determines to what extent actualization takes place (Davis & Rimm, 1989). Talented students need talented programming like general education programs in order to meet their ability needs (Hertberg-Davis & Callahan, 2013). The superior class program has a positive effect on post-school student plans (Kell, Lubinski, & Benbow, 2013).

In addition, the informant also informed the existence of reinforcement classes in the form of routine activities every evening with the term additional hours of study for gifted students, where the material reviewed was material on the National Examination. Empathy and social skills are the right factors in building positive interpersonal relationships with students. This context of gifted students each program for empathic understanding among students will directly enhance leadership capabilities, ability to influence others, communication skills, collaboration or collaboration (Wulan, 2011). "We implement afternoon classes after school, which is an additional learning system. It is hoped that students will be able to add insight and learn to high-level capacity compared to regular classes", said the Class Manager.

Thus, given this gifted students have a high level of significance. The informant also explained that gifted students were not only found in the MIA class or specialization in the field of natural knowledge (SCIENCE), but were found in class Iis or the social field. However, the informant added that the tendency of students to be gifted more towards the field of science was seen in how they often analyzed theories and formulas in depth and enthusiasm for being friendly to the environment. "I prefer science because I like biology and environmental conservation, "the opinion of one student was gifted".

Based on the program description and various launching activities, the tight schedule does not decrease the spirit of learning. Indeed, the planned program carried out with his colleague can be encouraged again. Thus, peer influence is very important in seeing the development and abilities of gifted students. One of the uniqueness that they have is the nature of perfectionism (perfection beyond) and have their own thinking style. This student has a high standard to achieve something that is desired throughout his life. This is in accordance with research (Razak, Zainun, Asmuje, & Sallehan, 2017).

Further data is said that for the Gifted Student Curriculum competency has not been determined accurately, especially for the Ministry of Religion. Based on data from informants, it is said that all aspects of activities such as Intra-School Activities which include reinforcement classes or additional hours of learning, soft skills and other programs as a whole can be a reinforcement of knowledge and quality of ability. The existence of the application of Pre-test and Post-test is the term warming-up in learning to be an added value for students in improving the quality of learning and exploration of their abilities. Gifted students' thinking styles are not only analytical, critical, creative, and logical. However, periodically include: executive thinking, judicial, monarchical, oligarchic, anarchic, global, local, external and conservative. However, it is also not dominant in legislative, hierarchical, internal and liberal thinking styles (Razak et al. 2017). *"Before learning begins I prepare pre-test and post-test questions at the end of learning. I did this to evaluate student development. And thank God, it was successfully implemented. Indeed, students are more enthusiastic and like this system because they are competing to get the highest and best grades,"* said one of the superior class teachers.

Based on the results of data analysis, in an effort to form a classroom atmosphere and sharpen the brain. Reviewing the material and testing students' understanding of what has been learned or not yet learned is very important in teaching and learning activities. Uniquely, gifted students are never instructed in terms of reading or learning before the next day's material is studied. In essence, they realize that they need insight and knowledge before class begins. Another thing that reflects the attitude and nature of a gifted student to speed in doing tasks, has a high creativity, and is able to explore the ability of self and imagination well. The curriculum taught in these superior classes broadens and deepens standards by adding, enriching and accelerating content (Khalil & Accariya, 2016).

In line with Herry's research (1993), by explaining once the Gifted and Talented children have been able to understand the lesson, while other children need several times to explain / explain it, if there is less anticipation from the instructor the wasted time will be used for activities as he pleases, including acts of disturbing / harassing his friends. Much has to be nurtured and explored from every preparation to the gifted and Talented child and can also be adopted and developed one or all of the skills possessed by the gifted and talented children. Students are more concerned with the personality inherent in the teacher than the teaching skills acquired (Khalil & Accariya, 2016).

Recommendations

For Further Studies

The abilities possessed by gifted students greatly affect all their activities. The findings of the study are four components of gifted students' profiles which include: (i) students having creative and active capacity, (ii) gifted students have a very high curiosity, (iii) more gifted students tested because they like challenges, and (iv) students are more responsive and easily memorized. Based on the findings, it shows that gifted students in Madrasas in Lampung Province need to be thoroughly developed so that all aspects of their abilities are fully facilitated.

Based on the description above, conclusions can be drawn; Efforts in preparing quality education can be done by implementing steps including: 1. Improving the ability of learners, 2. Utilizing the environment, 3. Increasing infrastructure and facilities, 4. Conducting planned monitoring and evaluation, 5. Developing learning evaluation tests, 6. Establishing school relations with the community, and 7. Improving basic competencies and improving attitudes that learners / teachers must have. If these steps are implemented, efforts to prepare quality education will be achieved well.

Some suggestions of this study is that in the implementation of cooperative learning process based on active learning obstacles that need to be bridged is time-consuming in its implementation, where appropriate, and the appropriate number of students.

Disclosure and Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. This research is original work and does not contain any libelous or unlawful statement or infringe on the rights or privacy of others.

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