

## **Developing Alternative Learning through Biotech for Kids**

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### **Implementation alternative learning activities through biotechnology for young learners**

I was graduated from biotechnology program, Gadjah Mada University in early 2012. But, I and my friends have a program to introduced science in fun way to kids. Then after I graduated and taught at Sanata Dharma University, I developed this program and implemented in Tumbuh Primary School, Yogyakarta. Initially, this program was intended to help gifted children at this school. Biotechnology for Young Learner (BTYL) was desaigned to address and reduce some behavioral problem of gifted children. Beside the behavioral problem, they also have high interest in applied science.

For this purpose, BTYL is designed with the inquiry method. The lesson starting by inviting children to explore problems from the themes presented, then the children are invited to formulate hypotheses and make proofs and observations as well as data analysis from the practices carried out. There is a reflection to provide reinforcement from the common thread raised in the theme. As a celebration and presentation, the children were then supported to do peer tutoring to their classmates.

The modul was arranged related to each curriculum that used by this school. Tumbuh Primary School have 4 school that use different curriculum. Tumbuh 1 use National plus, Tumbuh 2 use Cambridge, and Tumbuh 3&4 use IPC. So, before I wrote the modul, i learnt about the theme of the curriculum and children charactersitic.

The reason why Tumbuh Primary School made a additional program to gifted student are differentiation of the curriculum for gifted students is the best way to optimize their potential. lly gifted students have high interesting in science and technology. One of the themes in recent science and technology is biotechnology. Biotechnology is a sample of modern science which provides teachers with a context to show how teams of scientist, technologist, and social scientist work together (Andrina, et all. 2015). It also provides opportunities for students and teachers to explore and critically debate and dilemmas in ethical issues that arise during the process ( France, 2007). Furthermore the social and political issues arising from the practice of biotechnology provide a rich context to link science with the life world of the students.

I desaigned 6 season modul of BTYL with different themes but tangled each other. One season contain material and lesson for one year (two semester). One semester delivered in 10 meetings. Season one talked about basic biotechnology for kids and fermentation. Second season talked about agriculture in my country. The third supported children to thought about how the healing our precious earth. The fourth and fifth, empowering children to desaigning a simple water conservation, and the last season encouraged children to developed simple therapeutical food from local foods. And then, all the module was compiled and published as a book "Biotechnology is So Fun" by PT. Kanisius in 2019.

Then during the pandemic, I developed a biotech for kids lesson using the experiential learning method. This activity was held with KRYA ID with title Homie Days Biotech for Kids. The learning flow is to inspire the children who participate in interactive discussions about their experiences regarding the material to be delivered. For example, when discussing alternative foods from local tubers, I invite the children to remember tubers and other known carbohydrate sources. Then, the children will be invited to get to know the basic concepts of plant cloning. From there they were then given the challenge to design their own experiment about cloning. After they carried out experiments and observations (means a week later), the children were invited to discuss the results and then given another challenge to think about what next to do after getting this experience.

### **Best practice in implementation alternative learning activities through biotech for young learner**

Because initially BTYL was designed to reduce behavioral problems, so observation and document studies were collected from the implementation in the class. Qualitative analysis has done to teacher's questionnaires to identify the effectiveness of the program. Qualitative analysis also has done to the student's log book and posttest to observe everyday progress. The behaviors of the students influence to be better. Based on our observation, there is no clear linkage between the program activities in class activities. But, three students showed their influence to made conclusion during their experiment class activity. Two students assist the teachers in class and able to re-tell the experiment of biotechnopreneurship but they couldnot remember the experiments detail. One student did not show any changing of his problem.

The follow up of this activities, we will lead this program to entrepreneurship by motivated the students to make their own biotechnology product as have been taught to them this semester. Then, they will sale those products to their classmate or in school fair (Sari & Rosada, 2013)

BTYL, which was implemented in Tumbuh Primary School, in 2015 we tried to examine it qualitatively. We drew qualitative data gathered from observations, teachers' interview, teachers' reflections, children's journals, photos and video recordings. We examined the impacts on classrooms' knowledge development, children's attitude towards learning science, sharing and contributing skills, and social interactions. It is observed that the program has supported children tutors to develop characteristics of expert learners. We also have identified barriers of maximizing participation and engagement of all children. False conceptualizations of inclusion of classroom teachers were the main barriers presented. The paper concludes by highlighting the need for schools to establish cultures that challenge the way teachers conceptualize difference, differential learning and academic achievement. Teacher should be encouraged to work towards a pedagogy focusing on social justice and equity, viewing classroom as community of learners, enabling classroom members to contribute, rather than individuals with deficits to be fixed (Andriana, et al., 2015).

The feedback from Homie Biotech is also so relieved. The students that attended at this class did all the experiment, sent worksheet to us and also developed their own idea into small research regarded their experience in this class.

## **Conclusion**

Simple biotechnology is an alternative learning for children. This program help them to develop their 21st century ability like observing, analysing, critical thinking and ideating idea from their hands on experience.

## **Rerefence**

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