

The development of learning based on the Connectivism model in Biology, genetics engineering for twelve Grade students.

Ms. Pawinee Rattanakorn

Abstract

The development concerning instruction of biology: genetics and DNA technology by utilizing a social network is based on Connectivism in order to promote inference skills. Twelve grade students were selected into a sample group (n) by randomized sampling by classifying into an experimental group: the students learning genetics and DNA technology with a social network and a control group: the students learning the subjects normally and being given a writing assignment. According to learning achievement comparison, the experimental group had better post-learning achievement and better obtained inference skills than the control group with statistical significance at .05 level, signifying that instruction of genetics and DNA technology by utilizing social media is one of learning management which offers a better learning opportunity to students through a search of data via information technology and offers higher inference skills. This can help students obtaining critical thinking process and applying knowledge in routine problem solving appropriately.

Keywords: Connectivism, inference skills, instruction utilizing social network

Background and rationale

Science plays and will play an important role in the present and future. Given that, a scientific education emphasizes the development of student's cognition concerning rationality, creativity, analytical thinking and critique. The development also emphasizes knowledge-seeking skills, systematic problem solving and decision-making based on large amount of data and traceable empirical evidence (Ministry of Education, 2009: 1). Allowing students to gain practical skills and to be educated by utilizing scientific process, it can encourage thinking and planning capability in students for self-learning and enable deduction capability in the contents learned in a subject, creating true cognitive capability in the students in conformity with the National Education Act, B.E. 2542 (1999) (revised in B.E. 2553 (2010) which was stipulated as "Educational administration and management must be in pursuit of self-learning and self-development in students and those students shall be our first and foremost priority".

A study concerning genetics and DNA technology is related to an implementation of knowledge in genetic field to create genetically modified organism or GMOs which is a lifeform possessing genes as required by human. Currently, they are considered to be the scientific field continually developed and applied; however, with the traditional way of instruction having its limitations in teaching time, it causes instructors a difficulty as they are unable to provide examples and multiple explanations leading to boredom in class; moreover, students are lack of cognitive thinking skills for identifying the fact in data resulting in mediocre learning

achievement. In these matters, the development concerning instructional materials and teaching method to encourage learning in content theories and to develop scientific process skills altogether are critical. At the present, instructional materials and management systems have been implemented to solve the problems in order to create the instructional management suitable for multiple circumstances of student i.e. instructional module, self-learning instruction set, computer lessons in multimedia format and prefabricated lesson plans, etc. Social network is one of another way to allow students to learn by themselves and to gain freedom in what they would like to learn and search. Consequently, these help them in self-development in inference skills, cognitive thinking in the fact obtained in learning and deduction of the data into the group's fact or knowledge. With this concept, in case an instructor applies such social network to appeal and promote learning by programming scenario and allowing students to learn via social online network i.e. Twitter, Facebook, WhatsApp and Line, it will offer students opportunities in searching, thinking, interpretation, analysis, critique and deduction to infer from such obtained data and further connect to learning as per lessons resulting in better learning achievement (Information and Communication Technology Center, 2011:10)

Objective(s)

1. To compare learning achievement of students learning genetics and DNA technology with social network model with students learning with normal model with writing assignment;
2. To compare inference skill capabilities of students learning genetics and DNA technology with social network model with students learning with normal model with writing assignment;
3. To develop an instructional model regarding genetics and DNA technology as per Connectivism to encourage inference skills for twelve grade students.

Related literature

Scientific process skill

A Scientific process skill is a behavior influenced by systematic commitment and training leading to efficiently and reliably intellectual development, problem-solving development and new knowledge seeking. The skill can be categorized into 2 major levels (The Institute for the Promotion of Teaching Science and Technology, 1983: 1-5) i.e. basic science process skills including 8 skills such as observing, measuring, classifying, identifying relationship of space and space and time and space, calculating, managing action and communicating definition of data, inferring and predicting and integrated science process skills including 5 skills i.e. formulating hypotheses, defining operationally, establishing and controlling variables, experimenting, interpreting data and concluding.

Inference skill

There is several definition and meaning of inference skills i.e.

Thananee Phrathan et al. (2003:31) defined data inferring as a skill for giving an explanation in details derived from observation of an object or a specific event and an ability to distinguish between an observation and inference and to deduct the recorded or alternately

obtained data, then predict an event, hypothesize and conclude by basing on such data. Inference skill is a method for giving an explanation beyond observed data by using existing knowledge, experience and reasoning or adding personal opinions. To demonstrate whether a person obtains such skill, he/she must demonstrate particular behavior: an ability to explain or deduct the data obtained from an observation with additional opinions by utilizing existing knowledge or experience. Inferring from the same data can be diverse, which may be true or false depending on how thorough, accurate of data; how knowledgeable of an inferrer and experience and observability of an inferrer.

Manomanut Suthsin (2005: 124 cited in Suwanut Niyomka, 1997: 461) defined and exemplified questions encouraging inference skills as they, the questions related to such skills, need an answer which describes a cause of event, clarifies doubtfulness and is an inference from data by depending on existing principles or experience as a tool for supporting an explanation which does not relate to prediction or conclusion and mainly utilizes a deduction.

Connectivism

In 2004, George Siemens and Stephen Downes proposed a theory, Connectivism and defined such theory as “a learning theory for the digital age” or the digital age learning theory. Supposedly, the world is full with points of data, which may be in the forms of text, symbol, image, sound, transforming themselves as extensively scattered nodes; these nodes may have a connection, massively linking with other points of data. Nonetheless, the instruction trend in 21st century, which considers as the digital age, considers an internet technology as the important learning factor. Utilizing this such technology in the present and future, a role of user will not just be an information consumer but also, in a certain time, a content creator. Namon Jiransuwan (2012: 54) provided a definition of Connectivism as a theory derived from technological advancement of internet which is rapidly and constantly evolved leading to a change of learning from the previous generation. It is believed that such learning can occur unstoppably and infinitely and it can occur anywhere and with any connecting method. George Siemens defined a definition of Connectivism as an integration of complex, networking and integrated survey principles, as well as self-regulation learning theory. Learning is a process possible to occur in person externally, emphasizing specific connection and an ability to learn new data that is far more important than existing knowledge. The theory has been designed by basing on a concept: learning theory for digital age; that is to say, learning for digital world which digital media and internet play a role towards accessibility in internal news and information.

Tanomporn Laohajaratsaen has summarized Connectivism as learning occurred from a connection to develop into a network. Seeing that the traditional learning theory being incapable to satisfy the learning in young people in digital age amidst several developing technologies surrounding them i.e. mobile phone, Ipod, notebook and internet, etc., all of which, technologies, are used by them, Learning under the Connectivism is occurred from a decision of learners who select their surrounding learning resources, especially the one within online world and render such resources to be meaningful for themselves. Learning is occurred from a connection with

surrounding societies and networking. When learners are able to acquire seemingly unclear information, though, feeling, image and interaction to arrange into a meaningful connection and utilization for their learning, it is deemed the learning is actualized (Panita Wanpirun, 2010: 189 cited in Tanomporn Laohajaratsaen: 2010).

Methodology

Population and sample

77 twelve grade students from room 3 and 4 were randomly selected into a sample group by simple random sampling. The group was categorized into an experimental group: the students learning genetics and DNA technology with a social network and a control group: the students learning the subjects normally and were given a writing assignment.

Tool(s)

Tools utilized in the study and experiment were consisted of

1. A instructional plan concerning the social network model: genetics and DNA technology to encourage inference skills
2. Scientific learning achievement evaluation forms
3. Inference skill assessment form

Procedure(s)

First, an instructor assigned DNA technology topics. Second, the instructor formed an experimental group as a sub-group. Third, the draw of topics of inference skill promotion was taken place. Fourth, there was a search of data and opinions were expressed via social network (each representative of the groups posted the topics on LINE apps). Fifth, the data concerning inference was collected from log file or print-screen function. Finally, each member of the groups inferred. In regard to students in the control group, they were assigned to search data as per topics and given a writing assignment. Measurement, evaluation and assessment were performed by T-test dependent by comparing between the learning achievement and inference skills of the experimental group and control group.

Results

With the study, an average score of learning achievement from the experimental group with social network model: genetics and DNA technology to encourage inference skills yielded 15.00 and 11.43 for the control group, T-test equaled to 11.006, signifying that an average score regarding the achievement yielded from the experimental group was higher than the control group with statistical significance at .05 level. In the matter of a comparison of inference skills between the experimental group and control group, an average score of the skills yielded 15.00 and 9.90 for the control group, T-test result was 7.670, meaning that an average score concerning inference skills yielded from the experimental group was higher than the control group with statistical significance at .05 level.

Conclusion and discussion

The study: the development concerning instruction of biology: genetics and DNA technology by utilizing a social network based on Connectivism to promote inference skills for twelve grade demonstrates that the model is capable to encourage better learning achievement in students and encourage inference skills than the normal model with writing assignment owing to an application of information technology in learning and data searching as per assigned topics. With students learning to search data from multiple sources, this make them to gain better knowledge concerning genetics and DNA technology leading to the opportunity for the students to expand their thought with their existing knowledge as the foundation. In this regard, it is suitable for implement in instruction in secondary education degree as the students possess some existing knowledge and skills in searching data via information technology. Nevertheless, there are some disadvantages in this model; that is to say, it is unable to promote collaborative learning as the students were able to obtain data as searched and took it to process, assign meaning, connect, infer and conclude. Therefore, for more efficient instructional management, instructors should allow students to take their obtained knowledge, understanding and inference to collaboratively discuss in the class, the instructors will be responsible in advising and guidance to encourage learning and inference skills for other students.