2.Artikel Nana Sepriyanti

by Nana Sepriyanti

Improving Students' HOT and Literacy Skills in the context of Indonesia

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The results of some research indicate that a student's Higher-Order Thinking (HOT) skills and literacy skills are low in Indonesia. This is thought to be because students tend to do the learning process mechanistically. Through this research, 21st century competency-based learning has developed a valid, practical and effective set of Education Statistics courses to improve the HOT Skill and Literacy Skills of FTK UIN Imam Bonjol Padang students. This research was conducted through a cyclical process: preliminary phase, prototyping phase, and assessment phase. Data collection methods used were observation, interviews, checklists, videotaping, analysis of student work, validation sheets and HOT Skill tests and Literacy Skill students. The collected data were analysed with descriptive statistics and inferential statistics. The results showed 21st Century Competency-Based learning improved HOT Skill and Literacy skills of UIN Imam Bonjol Padang Students as a valid, practical and effective tool.

Key words: *Learning Process, HOT Skill, Literacy Skill.*

Introduction

The 21st century is marked as the global century. In the 21st century, life of humankind underwent fundamental changes that are different from the previous century. The global community asks for quality in all human endeavours and works. Naturally, the 21st century demands quality in human resources, professionally, and institutions are managed so that they produce superior results (Tobari et al, 2018; Apriana et al, 2019). The new demand asks for breakthroughs in many aspects and ways of thinking, conceptualising, and acting. The 21st century is also known as the age of knowledge. In this era, all alternative efforts have to meet the needs of life in various contexts more based in knowledge. Efforts to meet the needs of the field of knowledge-based education, the development of a knowledge-based economy, the

development and empowerment of knowledge-based social empowering, and development in industry is also based on knowledge (industry-based knowledge) (Mukhadis, 2013; Sarina et al, 2019; Irmayani et al, 2018; Kristiawan et al, 2019; Lian et al, 2018). The need for 21st century skills among students is very crucial in facing the demand of the nation and the world. It is also important that these skills align with Sustainable Development Goals (SDGs) and Malaysian Education Blueprints – Higher Education (MEB-HE) in developing and enhancing students with interpersonal skills focussing on critical thinking and problem solving, communication, collaborative and creative and innovative Islamic Studies which have always been seen as a discipline that has been preserved and the delivery of the knowledge is also expected to be conventional and traditional (Hashim, I & Samsudin, S, 2020).

According to Wagner (2010), there are seven 21st century skills that need to be possessed: (1) critical and problem-solving skills, (2) collaboration and leadership, (3) adaptability and agile, (4) initiative and entrepreneurial spirit, (5) communication effective, (6) the ability to access and analyse information, and (7) curiosity and imagination. BSNP (2006) in the other hand introduces a series that include: (a) Critical-thinking and problem-solving skills, the ability to think critically, laterally, and systemically, especially in the context of problem solving; (b) Communication and collaboration skills as in the ability to communicate and collaborate effectively with various parties; (c) Creativity and innovation skills, the ability to develop their creativity to produce innovative breakthroughs; (d) Information and communications technology literacy, the ability to utilise information and communication technology to improve performance and daily activities; (g) Contextual learning skill, the ability to undergo contextual independent learning activities as part of personal development, and (h) Ability of information and media literacy, the ability to understand and use various communication media to convey various ideas and carry out collaborative activities and interaction with various parties (Risdianto et al, 2020; Wandasari et al, 2019). According to the NEA (2002), there are 18 kinds of 21st century skills that need to be provided to students. However four of them were including the aspects of learning and innovation skills-4Cs, which consist of *critical thinking, communication, collaboration,* and *creativity.*

Henuk (2015) argues that scholars in Indonesia not only have high cognitive knowledge, but also need to be innovative and skilful. Productive workers in the 21st century according to the National University of Singapore must have competencies i.e. teamwork, problem solving, ability to take initiative, desire to learn, interpersonal skills, ability to work independently, oral communication, and flexibility in applying knowledge (Tan, 2003). In short, the needs of the 21st century for an educator are a teacher who is qualified and professionally trained. Therefore, 21st century teachers are expected to have the characteristics of adapters, visionaries, collaborators, learners, communicators, models, and leaders. 21st century teachers must be able to adapt to the curriculum and requirements needed to teach with digital

equipment. Teachers must be able to adapt with hardware and software to facilitate learning (Murtiyasa, 2016).

Sizer (in Johnson, 2011, p.181) states that school or university is an institution of learning, where one can train the mind, think creatively in facing important issues, and/or to maintain the habits. To support the learning process in schools and in tertiary institutions, an appropriate approach is needed; an approach that is oriented towards students that involve students learning interactively and giving them the opportunity to communicate and deliver their arguments.

According to Craig (2011: 70), in the 21st century, higher order thinking skills are important because there will be many unusual problems in the 21st century that students are unlikely to have been involved with, during the learning process. Assignments related to various problem solving are necessary, not just things that are related to memorising the subjects, and dictation. Griffi, Care, & McGaw (2012: 9) say that higher order thinking and problem solving are things needed by someone to work in this century so that it will affect teaching and assessment. It is also strengthened by the opinions of Heong, Yunos, Hassan, Othman, and Kiong (2011: 281). Higher order thinking skills (HOTS) are an important aspect of teaching and learning activities. HOTS require learners to utilise information and ideas by changing their meanings and implications. This is like when a learner combines facts and ideas then synthesises, generalises, explains, hypothises, or concludes (Newman and Wehlage, 2013). HOTS are interpreted as the ability to use the mind to solve problems faced (Onosko & Newmann, 1994).

The other skill required for young people in the global era is literacy. The Ministry of Education and Culture (2017: 2) states that the skills needed in the 21st century are basic on literacy, competency, and character (Diejendikdasmen, 2016). Kern (2000) revealed that literacy education needs to involve: interpretation, collaboration, conventions, cultural knowledge, problem solving, reflection and self-reflection, and the use of language. Managing the human capital of IR 4.0 is not an easy task since it requires continuous innovation and learning dependent on people and enterprise's capabilities. Personality profiling strategy for appropriate worker screening approaches can play a vital role in the development of dynamics capabilities in Higher Learning Institutions (Yunus, A,R, Sharif, S,M, Majid, I,A , 2019).

The Education Development Centre (in Syahid, 2017) describes that literacy is interpreted as an ability possessed by individuals to read, both text and context and use it in everyday life. UNESCO (2006) harmonises literacy with literacy, which means cognitive, reading and writing skills, both in the form of text and context. Therefore, literacy is the essence of education. Through literacy, one can understand the information received (UNESCO, 2006).

Literacy is also interpreted as social practices and interactions related to knowledge, language, and culture (Teguh, 2017). The National Development Team (2017) classifies literacy components, including: Early literacy, basic literacy, library literacy, media literacy, technology literacy, and visual literacy. In order to realise the ability of literacy, the Government launched the School Literacy Movement (GLS). Understanding School Literacy in the GLS context is the ability to access, understand, and use something intelligently through various activities, such as: Reading, seeing, listening, writing, and or speaking (Retnaningdyah, 2016). This is in line with the demands of reading skills in the 21st century, namely the ability to understand information analytically, critically, and reflectively (Dirjendikdasmen 2016) Therefore, literacy education needs to be conducted to involve: Interpretation, collaboration, conventions, cultural knowledge, problem solving, reflection and self-reflection, and the use of language (Kern, 2000).

Based on observations and relevance studies, it was found that the tendency of teachers to teach mechanically had caused several problems with learning in Indonesia (Sepriyanti, Nofadila & etc, 2019; Sepriyanti, Yulia & Prihartini, 2018). The same condition was also found in the results of the PISA study which showed that Indonesia's ranking was always below 10%, and almost no Indonesian students reached the two highest levels (levels 5 and 6) (Stacey 2011; Fauzan, 2002; OECD, 2013, 2015). That is, Indonesian students are still recorded as weak in their higher order thinking skills (HOT). Indonesia's ranking in the PISA study for the last 3 (three) periods in 2009 was 61 with 65 countries participants; 2012 Indonesia Ranking 64 with 65 countries participants; 2015 Indonesia Ranking 63 with 70 countries participants (Source: OECD, 2015).

Research conducted by Trilling and Fadel (2009) shows that high school graduates, diplomas, and higher education are still less competent in terms of: (1) oral and written communication, (2) critical thinking and problem solving, (3) work ethics and professionalism, (4) work in teams and collaborate, (5) work in different groups, (6) use technology, and (7) project management and leadership.

In observing the learning problems as explained above, universities, especially in Tarbiyah and Teacher Training Faculties (FTK), there should be the main actors in determining the solutions to the learning problems. The biggest challenge actually lies within the teachers and lecturers. A teacher as an agent should prepare the next generation to be ready and be responsible in facing unpredictable changes. A lecturer as the protocol has to be able to direct and guide the future teachers who are ready to face the challenges in preparing the younger generation that fit the modern era. Yet, they also need to be equipped with tools that are capable of dealing with 21st century situations. Students must be competent in understanding and using information, media and technology.

Imam Bonjol Padang Islamic University is one of the Islamic State University which has only been transformed into a university for two years, with a vision of "Becoming a competitive Islamic University in ASEAN in 2037" expected to be competitive in a quality international arena that has 21st century competence with HOTS and various literacy. For this reason, curriculum, educators, education staff and students must focus on achieving the vision of this UIN institution with hard work, having a variety of creativity so as to produce skilled, professional, and intellectual Muslim people who can compete in the international world.

Therefore, bear in mind the importance of 21st century competencies containing HOTS and various literacies that will affect the course of the learning activities. This research will be carried out on the 21st Century competency-based learning models that aim to increase HOT Skills and Literacy in Tarbiyah and Teaching Faculty. The research will examine this product used by students of the UIN Imam Bonjol Padang School to understand how valid, practical and effective it is.

Materials and Methods

This type of research is development research, which is the type of research used to produce certain products by testing the validity and practicality of the product. In this study, the development model that will be used is the Plomp development model. This development model was chosen because of the clarity of what needs to be done at each stage of development. The product to be developed is the 21st century competency-based learning tool to improve HOT Skill and the literacy ability of students of of UIN Imam Bonjol Padang.

Development research according to Seels and Richey (Sunardi 2014: 103) is oriented to product development and the development process is described very carefully then the final product is evaluated. Research & Development (R&D) has a variety of models, but in this study the model used is the Plomp model. The Plomp development model was chosen with the consideration that this model is more systematic, directed and suitable for the development of Textbooks.

The development of 21st century competency based Education/Elementary Textbooks to improve HOT Skills and literacy capabilities that are valid, practical and effective uses the Plomp development design (2013: 19) which has three stages or phases, namely: Preliminary Research (Preliminary Research), The Prototype Phase (Development or Prototyping Phase) and the Assessment Phase (Assessment Phase). The Plomp development research design cycle can be seen from Figure 1 below:

Figure 1. Systematic Research Design Cycle (Plomp, 2013: 15)
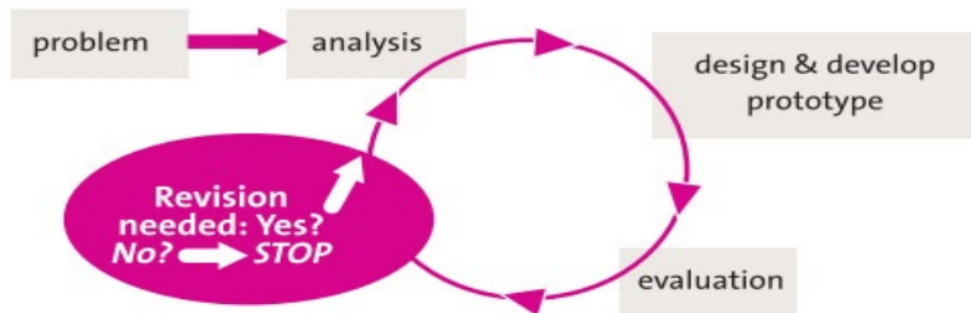
There are two forms of evaluation, formative evaluation and summative evaluation (Sukiman, 2012: 79). In this study, the formative evaluation was used. Formative evaluation is seen as the process of collecting data about a product during the implementation of development, which aims to improve the state of the product before producing the final product. Formative evaluation has different functions in each development phase. The preliminary research phase evaluation focuses on content validity. In the development or prototyping phase, evaluation focuses on relevance (content validity), consistency (construct validity) and practicality. And the Assessment Phase on practicality. According to Tessmer in Plomp (2103: 34), the formative evaluation has several layers as illustrated in Figure 1.

Results & Discussion

Learning tools with skills in the 21st century are designed based on preliminary research analysis, which is believed to be an analysis of content needs, concepts and analysis of student needs. Content structure analysis aims to establish the basic problems faced by lecturers in the learning process so that the development of textbooks is needed. Content structure analysis is carried out by conducting non-formal observations and interviews with lecturers on education statistics and students of UIN Imam Bonjol Padang. The analysis carried out at this stage is the analysis of mathematics learning problems and the lack of efforts to improve HOT Skills and Literacy, curriculum, and relevant learning approaches to overcome these problems. Based on observations and interviews, mathematics at UIN Imam Bonjol Padang, sees lecturers only use textbooks. The teaching book used only contains theories, examples of questions and exercises from the 21st Century era.

The learning process with 21st Century skills is designed in such a way that students actively develop concepts through recommended learning stages in HOTS and Literacy-based learning, namely Cooperative Learning, Discovery Learning, PBL, CTL, Information Search and Topical Review. Thus, this is expected to be able to overcome the learning problems described previously, so that students can be more evenly active in the learning process and in

order to increase HOT Skills and Literacy in the learning process in these learning activities. Concept analysis aims to identify the concepts of Educational Statistics that will be taught and developed in the Textbook. Student analysis aims to determine the characteristics of students so that the textbook design will be developed accordingly. This student analysis becomes the basis that the UIN Imam Bonjol Padang FTK student qualifies as a field trial. Analysis of students is done by non-formal interviews with lecturers of education. Characteristics of students analysed included academic ability, group work ability, educational background and attitude.

The next stage after the preliminary research stage is the development or prototyping phase. The development or prototyping phase consists of three prototypes: prototype 1 (Validity Test), prototype 2 (Practicality test with one-to-one evaluation) and prototype 3 (Practicality test with small group evaluation). In prototype 1 self-evaluation and expert review are conducted to test the validity of the textbook. The initial design of the prototype at this stage was self-evaluated by researchers using self-evaluation guidelines then analysed and revised based on the results of the self-evaluation. Textbooks that have been designed, validated by experts (validator). The validator is a person who is competent in preparing the textbooks and is able to provide input to perfect the textbooks that have been prepared. Suggestions from the validator will be used as material to revise the textbook that has been designed. This stage produces a valid textbook. Based on the assessment instrument in the form of a validation book, the textbook is divided into three, namely the material validation sheet, construction and language (Figure 2).

Figure 2. Average scores and Textbook Validation Categories
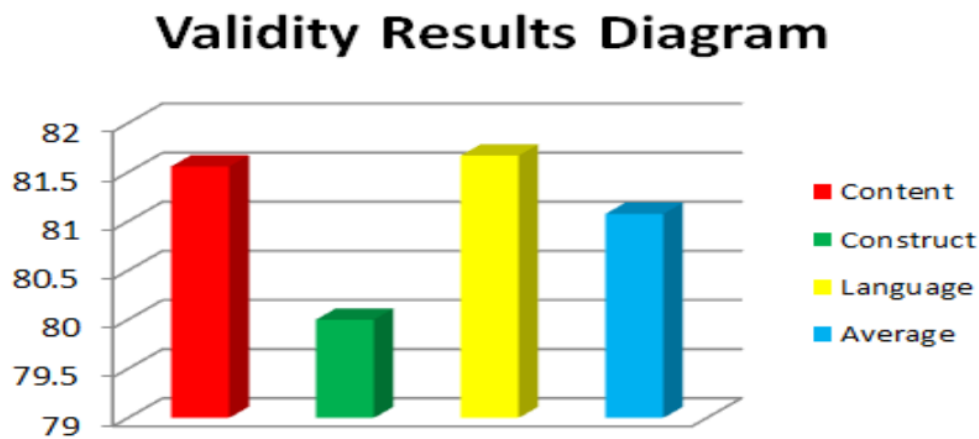
The validation results show that the textbooks get an average score of 82.84%. This score is included in the "very valid" criteria so the textbooks developed are very feasible to use. To

obtain input and assessment from experts, validators and practitioners, a Focus Group Discussion (FGD) was held, which was attended by the Math and Statistics experts, lecturers of Education Statistics FTK UIN IB Padang and some students who took Education Statistics courses as practitioners. Based on the advice from the informants, validators and practitioners, a revision of the product was made. After being revised, valid products are obtained in terms of content and construct. These valid products are used in the practicality stage.

After the validity test results, the textbook is declared valid by the experts (validator) on prototype 1 then the next stage is prototype 2. In prototype 2, this is done to find out if the parts in the textbook are practical or easy to use by lecturers and students as users. The first practicality test is done through one-to-one evaluation. One-to-one evaluation is done first by asking for an assessment or input from education statistics lecturer UIN Imam Bonjol Padang as the user of the textbook which is then revised. Among his suggestions the use of time allocation in the textbook is adjusted to the class time for each meeting. In a one-to-one evaluation, students give some responses, suggestions and criticisms, which generally can be concluded textbooks are easy to understand clearly and have an attractive appearance, but there are some inconsistent writings and writing that is too small.

After the textbook is revised based on input from one-on-one evaluation, a field test will be conducted. Field tests are conducted by means of small group evaluations, i.e. Textbooks are tested on students. Each student is given a textbook that has been improved and asked to read, understand and work on the questions in the textbook according to the instructor's instructions properly and correctly. Based on observations, the implementation of learning with the textbook is going well. Then some students were interviewed and asked for input and suggestions regarding the textbook that had been designed. Lecturers and students who have tried to work on the textbooks then fill out the practical textbooks.

Figure 3. Average Score and Practical Textbook Category
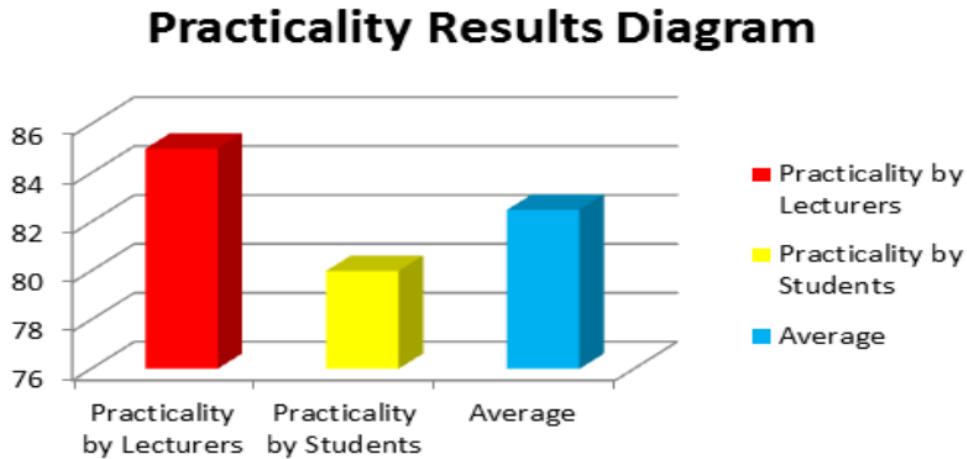
The results of the practicality instrument filling by the lecturer showed that the revised Textbook obtained an average score of 85% (see Figure 3). This score is included in the criteria of "very practical". According to Statistics Education Lecturers, portions of the textbook can be used properly without any significant obstacles. The results of the practical instrument filling by the students showed that the revised textbook obtained an average score of 80%. This score is included in the criteria of "very practical". According to students who use textbooks, sections in the textbook can be used properly without any significant obstacles.

The effectiveness of the use of 21st century learning tools that have been developed can be seen by conducting tests to determine the ability of HOTS and Literacy Skills of students. The instrument used was a matter of essay test. Based on the results of tests that have been carried out by scoring the ability of HOTS and Literacy Skill of students, the average value of HOTS and Literacy Skill of students is 78. The value of students who get an interval B is 77.78% (more than 75%), meaning the product can be said to be effective. In addition, when viewed from the first meeting during product trials, it was seen that the number of students who answered the questions independently practiced correctly and increased until the sixth meeting. Student errors in answering questions referring to indicators of HOTS and Literacy ability decreased each meeting as the students' ability in terms of HOTS and Literacy skills increased.

Validity test is a determinant aspect of product quality in the development of the validity of the textbook. This can be seen from the validity of the material, construction and language. Based on the description of the results, the validation of the textbooks that have been developed are already

good as evidenced by the validation score, with an average score of 82.84% with the criteria "very valid". This criterion was obtained after several revisions based on the suggestions from the validator.

The results of filling out the material validation instrument showed that the revised textbook obtained an average score of 85.29% with the criteria of "very valid". The results of filling in the construction validation instrument show that the revised textbook has an average score of 81.57% with the criteria of "very valid". Language validation is done after material validation and construction validation. According to the validator, there are only a few things that need to be revised from the aspect of language, as evidenced by the results of filling in the language validation instrument showing that the revised textbook has an average score of 81.66% with the criteria of "very valid". Based on the discussion that has been stated above, it can be concluded that the textbook after being revised has fulfilled very valid criteria so that it can be used in practical trials.

The results of the validity test show that the product of this study is feasible to use. It is tested at the next research stage. Some other arguments supporting the results of the validity test in this study are:

Firstly, the findings of this study show that the research product has fulfilled the fundamental assessment aspects in developing the model, namely the existence of logical consistency between the expectation model and the reality model. This result is in accordance with the opinion (Nieeven: 2013), the designed model must show a logical consistency between the expectation and reality models. Hope is interpreted that the model will be used. Actual or reality means that the model can be used.

Secondly, the results of this validity test also illustrate the use of product evaluation techniques revealed by Tessmer (1993) in Plomp (2013), namely in expert review and focus groups. Based on this theory, expert validation (expert review) is categorised and placed at the level the second in formative evaluation techniques that has been revealed by Tessmer (1993). According to Tessmer (1993) in Plomp (2013), products that are subject to expert validation have better levels of resistance than other techniques. Products, however, that have been validated by experts must still be revised, so that products have resistance which is stronger towards revision.

Thirdly, the results of the validity test show that this textbook has fulfilled the state of the art knowledge criteria. The state of the art knowledge aspect referred to is the consistency and relevance between the products produced. Then the content validity and construct validity of the product are carried out, and linkages are found in every textbook. The results are evidence in content validity and construct validity carried out by experts and practitioners. According to Nieeven (2013), aspects of the state of the art, also called content validity and consistency, mean

that various intervention components are logically related to one another, called construct validity.

The practicality test in this research was conducted to Statistics Education lecturers and students of UIN Imam Bonjol, Padang. This practicality test is carried out by means of lecturers and students' reading, giving comments and input to the textbooks, namely on educational statistics material developed, then lecturers and students are asked to fill out the practical textbooks to provide an assessment of the textbooks. The results of completing this practical sheet show that the textbook is included in the very practical criteria.

The practicality filling is done after the lecturers and students use the revised textbook. Practicality test results by students get an average score of 80%. Practicality test results by lecturers get an average score of 85%. Thus, the practicality of the textbooks developed was 82.25% included in the "very practical" criteria. This shows that the textbook can be used in class.

The effectiveness of the examined learning tools can be seen from the student results of HOTS ability tests and Literacy Skills. Based on data description and data analysis, it is known that using learning tools based on 21st century learning has a positive influence on HOTS and Literacy Skill abilities for students. Kenedi (2018) states that with HOTS, one can practice his ability to connect mathematical ideas and expand his thinking through the high-level questions given. Considering that students come from different backgrounds, for students at the elementary level it is necessary to analyse their ability to solve mathematical problems oriented to HOTS as a description of their ability to think at a higher level. The results of this analysis can be used as a reference to help students improve HOTS. A person who has HOTS is not only able to remember the formula, understand, and apply it, but he is also able to analyse mathematical problems given, evaluate the results of his work, and create new ways or perspectives or create knowledge to solve the problems faced (Winarso, 2014). This indicates the low ability to create Subject A. The ability to create according to the revised Bloom taxonomy is the ability to put elements together to form a unified or functional unit, which is to rearrange the elements into a new structure or pattern (Effendi, 2017).

Conclusion

Based on the results of the study it was concluded that the 21st Century competency-based learning tool is valid, practical and effective in increasing the HOT Skills and Literacy skills of UIN Imam Bonjol Padang Students.

Acknowledgements

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