Integration of Character Education in Basic Mathematics Learning in the Digital Age

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Abstract— This study aimed at describing the integration of character education programs into the learning of Basic Mathematics in the digital age. This research is a qualitative descriptive type that follows the model introduced by Miles & Huberman. The sampling technique used is purposive sampling. The process of integrating character education in basic mathematics learning starts from the planning, implementation, and learning evaluation stages. The main stages in the implementation phase are: 1) inserting character values in the Lesson Plan, 2) implementing e-learning, and 3) observing overall learning activities. The data were collected through interviews, observation, questionnaires, and documentation. The results of this research indicate that: 1) Students become wiser in using technology when character education was integrated in e-learning, 2) the educational environment alone is not enough to build student character, and there should be an internal and external support in developing positive character.

Keywords— character education, basic mathematics, e-learning, digital era.

I. INTRODUCTION

Strengthening character education is one of the efforts to anticipate the rapid development of technology and information in the digital age. In this era the dissemination of information is so fast and easily accessed through a smartphone without considering the source of that information. The development of digital technology that is completely automated should become a serious concern for all parties, especially in education. Higher Education is the most appropriate place to instill character education in which students are taught to think positively, filter out good information, and growth mindset. As the next generation of the nation, students must be prepared to face changes and be able to get adapted quickly. In addition, educators must also change perceptions about the concept of education, which not only teaches but also provides moral education to students. Therefore, it is expected that with the provision of moral character possessed, students may use digital technology and existing automation wisely.

Strengthening character through the education system is regulated in Decree No. 20 of 2003 Article 3 concerning the National Education System, which states "National education serves to develop capabilities and shape the dignified character and civilization of the nation in the context of educating the life of the nation, aiming at developing the potential of students to become human beings who believe and fear God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and become citizens of a democratic and responsible [1]."

Wynne provides two meanings of character. First, it shows the way a person behaves [2]. If students behave dishonestly, disrespectfully, and irresponsibly, it means the student manifests bad behavior. Conversely, if students behave honestly and being helpful, it means that the student manifests a noble character. Second, the term character is closely related to personality. Students can be called a student of character if the behavior is in accordance with moral rules [3]. The problem is if the character that develops in the student environment is a bad character. Some of the bad characters observed among students were: 1) lack of respect to older people, 2) less polite when communicating in both direct conversation or through messages, 3) dishonest during exams, 4) undisciplined in submitting assignments, 5) bullying friends, 6) there are cases of taking friend's notebooks, 7) going in and out of class without greetings and permission, and there are still quite a lot of phenomena that are not in accordance with ethics, honor, and religious norm. Some simple steps that need to be immediately applied by educators to overcome these problems include are: 1) teaching moral education during the classroom learning, 2) increasing knowledge about character education so that educators figure out the way and the abilities that must be mastered, 3) provide a good example in word and action, 4) improve the ability of technology to be able to implement e-learning well and can conduct online evaluations to avoid cheating.

Technological sophistication in the digital age cannot replace the role of lecturers as a whole in the classroom. The presence of a lecturer in the class is still very much needed in order to achieve the goals of higher education in the future because the task of the lecturer is not only to teach, but also to instill character. One of the main tasks of every lecturer is to educate students. There is a fundamental difference between educating and teaching. Educating does not only emphasize knowledge and skills, but also responsible for shaping the mental attitude/personality of students, wherea teaching is more technical in natureand emphasizes the mastery of certain knowledge, skills, and expertise.

In order to support the purpose of character education, educators need to implement appropriate learning strategies and manage all activities that support learning. This has implications for learning programs to be applied, better learning experiences, and lifelong learning attitudes [4]. In the end, when the students complete their education, they face a new problem that is looking for work. It is very

possible that future work will be transformed with technology supported by artificial intelligence. This becomes an opportunity as well as a challenge for tertiary education to produce graduates with skills appropriate to the 21st Century [4]. Through the strengthening of character education on campus, students will be provided with basic skills that are not only able to make life-long learners in the global information age, but also social abilities to participate as good citizens [5].

Students' skills are the key to success in their lives to answer problems that arise in the future. Some of the skills that students must possess are language skills, responsibility, flexibility, communicativeness, planning ability, leading skill, organizational skills, problem solving, ability and willingness to learn new things, and analytical/logic thinking [6]. Another opinion was provided by Dadan Nugraha who suggested four main skills needed to be able to successfully face the dynamics of the changing work world, namely: 1) information, media, and technology skills, 2) life and career skills, 3) learning and innovation skills, and 4) effective communication skills [7].

Towards digital automation in the digital era, education in Indonesia must continue to be improved starting from the curriculum, tools/facilities that are integrated with technology, and human resources. In doing so, the professional competence of lecturers in operating both computer-based and android-based technology must be improved. In line with this, in the context of the development of character education in schools it is necessary to hold good planning, right approach, and effective learning methods. All these efforts must be carried out, applied, and periodically evaluated by all parties involved that is schools, lecturers, students, and all educational staff [8].

Character education needs to be implemented systematically and continuously in order to build the emotional intelligence of students. Emotional intelligence (emotional quotient, EQ) is an important ability for students in order to prepare themselves for the future. With this preparation, students will be more successful in dealing with all kinds of life challenges, including challenges to academic success [9]. Based on Ki Hajar Dewantara's philosophy, character education is divided into 4 dimensions, namely 1) ethics, 2) literacy, 3) aesthetic, and 4) kinesthetic dimensions. These four dimensions can be packed into several learning methods, namely 1) assignment, 2) habituation, 3) training, 4) learning, 5) direction, and 6) exemplary [10].

The Josephson Institute of Ethics develops the six pillars of character, which explain the way students demonstrate the value of character in each of their actions. These characters include trustworthiness, respect, responsibility, fairness, caring, and citizenship [11], [12]. Furthermore, Megawangi in her research also developed 9 pillars in character education, including 1) love of God and the universe and its contents, 2) responsibility, discipline, and independence, 3) honesty, 4) respect and courtesy, 5) affection, caring, and cooperation, 6) confidence, creativity, hard work, and persistence, 7) justice and

leadership, 8) good and humble, 9) tolerance, peace, and unity [13], [14].

The Ministry of National Education has also identified 18-character values that need to be instilled in students, which is based on Religion, Pancasila, Culture, and National Education Objectives. The eighteen values are: 1) religious, 2) honest, 3) tolerance, 4) discipline, 5) hard work, 6) creative, 7) independent, 8) democratic, 9) curiosity, 10) national spirit, 11) loving the motherland, 12) appreciating achievement, 13) friendly/communicative, 14) loving peace, 15) fond of reading, 16) caring for the environment, 17) caring socially, 18) responsibility. The eighteen values can be filtered into 5 main values that were initiated by the Ministry of Education and Culture through the Movement to Strengthen Character Education which is part of the National Movement for Mental Revolution [15]–[17]. These main values are derived from Pancasila, namely; religious, nationalist, integrity, independent, and mutual cooperation [18], [19]. Each value does not stand up and develop individually, but rather interacts with each other, develops dynamically and forms personal wholeness [19].
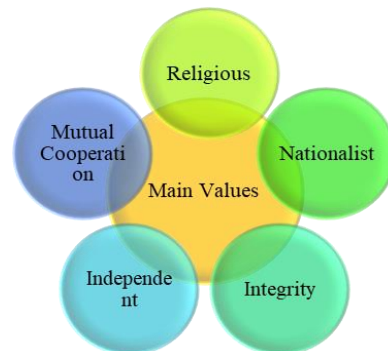

Fig. 1. Main Values of Character

Based on the background of the problems outlined above, it is very important to apply character education in higher education lectures. Therefore, researchers are interested in conducting a research entitled "Integration of Character Education on Learning Basic Mathematics in the Digital Age"

II. METHOD

This research is qualitative with descriptive method. The sampling technique used was purposive sampling. The respondents of this study were the students of Mathematics and Natural Science Education students who took the Mathematics class of 2019/2020. The researchers decided to choose these respondents because they were fresh students so that it was the right time to develop character education in which they have yet to be affected by the old tradition of the upperclassmen. The model of presenting the Basic Mathematics material used in this study is the Nested Model. In its application, this model was integrated with character education, namely by inserting character values in lesson plans, implementing e-learning in class, and evaluating learning activities as a whole. The objective of Nested models that are integrated with character education is multidimensional skills and concepts in one learning [20].

The data were collected through interviews, observation, questionnaires, and self-reflection. The data in qualitative research is focused more during the process of the data collection. The data were analyzed by using the technique introduced by Miles and Huberman Model. The steps of the Miles and Huberman Model are as follows [21]:

A. Data Reduction

In this activity, researchers focus on the objectives to be achieved, namely the findings. The data reduction refers to the selection, simplification, and transformation of rough data which was taken from the field. This stage serves as sharpening, classifying, directing, removing unnecessary and organizing data in such a way that the conclusions of the research can be drawn and verified.

B. Data Display

In this stage, the researchers create narrative texts, graphs, charts, relationships between categories, flowcharts, etc. which are intended to make an easier understanding of the condition that is happening on the field and used to make a further planning of work which is based on things that have been understood.

C. Conclusion Drawing and Verification

This stage refers to the conclusion made by the researcher which is based on the results of the data collection in the field. Conclusions drawing must be supported by valid and consistent evidence in order to obtain credible conclusions.

III. RESULTS AND DISCUSSION

The steps for integrating character education into Basic Mathematics learning are shown in Tables 1-3.

TABLE I. LANNING STAGE OF INTEGRATING CHARACTER EDUCATION

Criteria	Integration Activities
Planning Stages	
Socializations	1. Settling the main character values that originate from Pancasila, namely religious, nationalist, integrity, independent, and mutual cooperation. 2. The selected values will be implemented according to the learning objectives and conveyed through messages that are easily visible.
Developments in School Activities	3. Subjects Integration: • Developing lesson plans on existing competencies according to the character values to be applied. • Preparing assessment techniques that will be used • Preparing research instruments such as questionnaires, observation sheets, reflection on exam results, and interview guides • Preparing material for e-learning 1. Self-Developments Activities: • Culture and habituation • Academic Counseling

TABLE II. IMPLEMENTATION STAGE OF THE INTEGRATION OF CHARACTER EDUCATION

Criteria	Integration Activities
Learning Activities	1. Preparing learning material online using Moodle 2. Enabling Moodle to share ppt files/teaching materials and conduct discussion activities 3. After the presentation of the material is finished, a quiz is made in the form of an online game. 4. Showing the score of online quiz ranking to increase student's competitiveness during the implementation of online games. 5. Conducting active learning with classroom-based assessments accompanied by remediation and enrichment programs.
Developments of Culture and Learning Center	1. Main Activities: Greetings and praying before and after lectures, each class must ask permission, and make a letter of permission if the students could not attend the class. 2. Spontaneous Activities: Making donations when a friend is hit by a disaster or a contribution to the community when a disaster occurs. 3. Exemplary: Behaviors and attitudes of lecturers, education staff, and students in giving examples through good actions so that they are expected to become role models for other students. For example, the value of discipline (the presence of lecturers earlier than students), cleanliness, tidiness, affection, courtesy, attention, honesty, hard work, and confidence. 4. Conditioning Creating conditions that support the implementation of character education, for example, cleanliness of the body and clothing, clean toilets, trash cans, green yard with trees, and posters of wise words on campus
Daily Activities at Home and Community	5. Striving for harmony between characters developed in lectures and habituation in the home and community. For example, by creating a questionnaire regarding values developed in schools, with family respondents and the immediate environment of students

TABLE III. VALUATION STAGE OF THE INTEGRATION OF CHARACTER EDUCATION

Criteria	Integration Activity
Evaluation	1. Using a questionnaire to determine the character of the student 2. Using the observation sheet to determine the feasibility of character education in the class. 3. Using interview guidelines to determine student responses to learning that has been applied. 4. Evaluating the obstacles that occur during the process of implementing the integration of character education programs 5. Identifying existing problems and finding comprehensive solutions so that the implementation of character education integration programs can be achieved 6. Collecting and analyzing data found in the field to prepare recommendations related to future program implementation improvement. 7. Checking the success rate of implementing the character education integration program in tertiary institutions.

In order to foster the character of honesty and competitive value, researchers create quizzes in the form of online games in which the students used their smartphones

to play the games. One account is only registered for one time, to avoid cheating. Each time the students enter the game, they will enter the PIN given by the lecturer. The PIN is only valid for one game. Display assessment reports that can be seen immediately during the match as shown in Figs. 2. The results can be printed in Excel or PDF format. The results can be sorted by points obtained and the points earned can be seen by all participants so that they can foster their competitiveness.
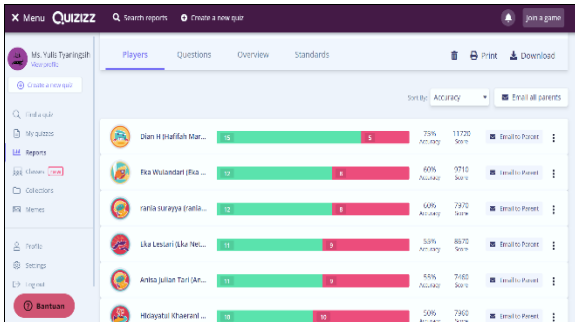

Fig. 2. Monitoring Student Work during the game

The results of the implementation of the character education program were taken from the observation sheet which was observed by 3 observers and consist of 9 aspects with each aspect consisted of 22 statements that were adapted from Benninga et al as shown in Table 2 [22].
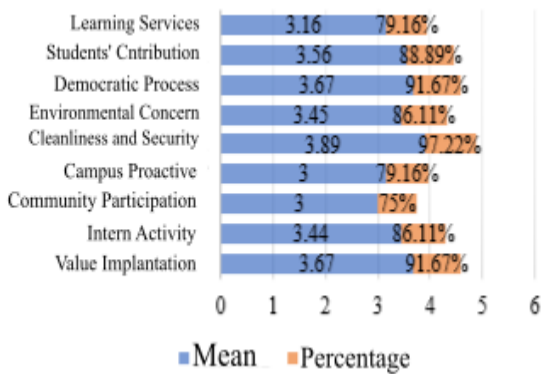

Fig. 3. Results of the Implementation of the Character Integration Program

Based on Figure 3, it can be concluded that Basic Mathematics learning integrated with character education can be implemented in the "good" category which is shown by the total average of each indicator ≥3 and the total percentage of each indicator ≥75%. This means that the successful level of implementation of Basic Mathematics learning was achieved, and that it was integrated with character education as well.

The following table concludes the results of interviews with students as a reflection of the learning process that has been carried out. This table contains a description that has been understood by, learning obstacles, targets to be achieved, and efforts to be done in order to achieve these targets.

TABLE IV. QUESTIONS AND ANSWERS OF THE INTERVIEW

Questions	Answers
1. Explains what you have learned!	Understanding set notation, set type, set operation properties; Analyze relationships between sets, and prove joint operations and extended slices.
2. What are the obstacles that occur in studying this material?	It takes a long time to understand step by step verification procedures; difficulty in understanding equivalent forms in set operations, specifically De Morgan's law.
3. What do you want to know more about this material?	Understanding the way to choose the right strategy in proving a theorem; exploring set material with Google Classroom and Websites; and the application of collection material in daily life in the form of animated videos.
4. What is your target after studying this material?	Having ability teach friends who are struggling; do the questions independently; able to answer exam questions easily; mastering all the characteristics of set operations so that it is easier to answer the matter of proof; able to think and reason more critically and creatively; and able to create new strategies or quick formulas for solving problems.
5. What efforts can you make to achieve these targets?	Studying material that has been discussed at home; studying the material of the next meeting at least a day before lecture; practice routinely in solving problems; discussion with friends or relatives; discussion through social media; read relevant books; and browsing the internet

The following data are the results of student reflections taken through questionnaires relating to activities at school, at home, and in the community to find out the character values namely religious, nationalist, integrity, independent, and mutual cooperation. In general, the results of the questionnaire can be shown in Figure 4.
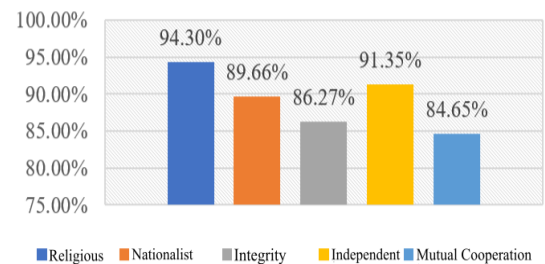

Fig. 4. The Results of Self-Passements of Students' Character

Based on Figure 4, the average character scores of students are in the "good" category. However, some attitudes need to be watched out for, namely mutual cooperation and integrity. It can be observed that the lowest percentage is the mutual cooperation attitude of 84.65% and the second-lowest is the integrity attitude with a total percentage of 86.27%. Therefore, it can be concluded that the character of mutual cooperation and integrity still needs to be developed, especially for classes with high individuality.

IV. CONCLUSION

Based on the findings and discussion, it can be concluded that 1) the integration of character education in e-learning makes students wiser in using technology, smartphones can be used for online quizzes by limiting

certain features that make learning to be more interesting, 2) educational environments that involve families and the community as partners to build character. Embedding character is not enough if it is only applied at school but it is necessary to involve families and communities to support the development of student character by providing appropriate stimuli.

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