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The Effectiveness of a Curriculum Designed Based on an Authentic Learning Approach in Improving Study Success, Attitudes, and Independent Learning Abilities of Prospective Teachers

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Abstract. This research aims to investigate the effectiveness of a designed curriculum with authentic learning principles in increasing study success, attitudes, and self-learning skills of prospective teachers. The method used is an experiment involving 300 prospective teaching students from various fields of study. The intervention in the experimental group was the use of a curriculum designed with authentic learning, while the intervention in the control group was the traditional curriculum. Several data analyses were used in this study, including descriptive analysis, independent sample t test, paired sample t test, and repeated measurement ANOVA. The research findings show that a curriculum designed with authentic learning principles can increase the success of prospective teachers. In addition, the authentic learning curriculum intervention is also able to develop the attitudes of prospective teachers toward curriculum development classes. The curriculum is also able to enhance the independent learning ability of prospective teachers. The increase in study success is seen in students' mastery of pedagogical knowledge and teaching skills. Improvements in the attitude aspect were seen in improvements in student attitudes in the belief in the benefits of curriculum development classes, the ability to evaluate classes, and the desire to learn. The increase in the aspect of independent learning ability was seen in the students' response in taking responsibility for their learning which experienced a positive increase. So, this authentic learning curriculum intervention can effectively increase the success rate, attitudes, and self-learning abilities of prospective teachers. This research has implications that teacher development education must use a curriculum that is designed in line with the curriculum used for students, namely authentic learning. This principle of authentic learning is able to enhance the competence of teachers from various aspects in order to improve the quality of teachers.

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1. Introduction

Currently, developments are occurring in all fields, namely education, social, culture, communication technology, and politics. All of these developments in various fields have resulted in changes in competence in several professions. Likewise with the people, who are required to be able to adapt and develop their own abilities so they can keep up with change (Chimbunde & Kgari-Masondo, 2021; Colbran & Gilding, 2019). This individual development and adaptation can be marked by an adequate education system and curriculum. Curriculum is a very important component in education and is one of the factors that also determine the competitiveness and economic growth of a country. The curriculum also functions as a means of transferring cultural values from the previous generation to the new generation. This curriculum brings changes and developments that are developed according to the needs and challenges of the time (Erdoğan et al., 2022; Quebec Fuentes & Ma, 2018). A fundamental aspect of curriculum development is the needs of students. The concept of curriculum refers to a combination strategy of several elements of content, materials, resources, and evaluation needed by students to achieve educational goals. The curriculum is also an overview of the contents of several subjects designed for students to obtain the expected abilities or competencies. Another explanation of the curriculum is that this curriculum component includes objectives, content, learning process activities, and evaluation (Menzi Çetin & Akkoyunlu, 2020; Poulton, 2020).

This research will focus on the material studied, study time, learning methods, and evaluation methods. There is a dynamic relationship between the teacher and the curriculum that can facilitate students to achieve their learning goals effectively. In addition, the effectiveness of using the curriculum is also very dependent on experience (Roach et al., 2018; Roth McDuffie et al., 2018). Teacher professional development education has a very vital role in determining the successful use of the curriculum. The teacher has a role not as an executor of the curriculum, but also has a contribution in curriculum development. The teacher's ideas are one of the keys to the design, development and implementation of the curriculum (Büscher & Prediger, 2022; Portillo & Lopez de la Serna, 2021). Competence in implementing this curriculum must be a concern of prospective teaching students so that problems do not occur in the future. In previous studies, it was found that most teachers thought that they were not reliable enough in implementing the curriculum, a finding which indicates that the curriculum design must be in line with the education and training of teachers (Ruiz-Madrid & Fortanet-Gómez, 2022; Shier & Van-Du, 2018). In addition, the curriculum development education class is also a pedagogical class that must be followed by prospective teachers. However, it is not enough just to apply class and curriculum development, but also teacher development education requires an authentic context in its implementation. Authentic learning and authentic evaluation used in the educational curriculum of prospective teachers will be able to significantly improve teaching

competence. Problems in real life are important features in authentic learning that must be used in the curriculum (Castaño-Muñoz et al., 2018; Hadianto et al., 2022).

Previous studies have confirmed that most teaching candidates find it difficult to make connections between the profession and real life (Quebec Fuentes & Ma, 2018; Roth McDuffie et al., 2018). This problematic can be overcome by designing a curriculum based on an authentic learning approach in teacher education. In line with these studies, the authentic curriculum is also able to create a good relationship between theory and practice. This competence is needed by teachers, especially in carrying out the learning process (Kohli et al., 2018; Labouta et al., 2018). Therefore, it can be concluded that the curriculum development of prospective teachers based on an authentic learning approach will greatly support their professional needs. Based on this elaboration, this study designed a prospective teaching curriculum based on authentic learning and investigated its effectiveness in supporting study success, attitudes, and independent learning abilities to support their profession. The difference between this research and previous research is that authentic learning is used as the basis for curriculum development, not as a learning method. In addition, the curriculum developed is the educational curriculum for prospective teachers. Thus, this study aims to investigate the effectiveness of a curriculum that is developed based on authentic learning in increasing the success of prospective teachers, positive attitudes toward teaching, and the ability to learn independently to support their profession.

2. Literature Review

Authentic learning was originally used to train individuals for apprenticeships before carrying out real work. Furthermore, authentic learning is designed by education experts and developed to support education. This authentic learning functions as a transfer of interests, beliefs, and real-life experiences within the classroom. Authentic learning also facilitates students to create, discuss, and construct knowledge and find solutions to problems students face in real life (Chimbunde & Kgari-Masondo, 2021; Poulton, 2020). Authentic learning is a tool that can facilitate students to obtain learning activities in accordance with real life and several previous studies found this authentic learning was able to improve the quality of student learning outcomes (Eisman et al., 2020; Song, 2020). As one of the strongest learning approaches, authentic learning must be accompanied by appropriate instructional design. The strength of the authentic learning approach lies in the learning principles and application of the instructional design (Kennedy & Yun, 2019; Menzi Çetin & Akkoyunlu, 2020). Through authentic learning, students obtain real learning experiences and they are required to be thorough and disciplined in each process. This authentic learning provides opportunities for students to develop their own learning approaches and seek alternative solutions to the problems given: authentic learning facilitates students to develop their academic abilities (Hadianto et al., 2021a; Labouta et al., 2018). Likewise, authentic learning is believed to facilitate prospective teachers to develop their teaching competencies through teaching applications in the process. This authentic learning is not only important for students, but also very much needed by teachers, especially prospective

teachers. Authentic learning includes authentic assignments, authentic activities, and authentic evaluations. Authentic learning in the process displays the knowledge and skills needed in real life (Hadianto et al., 2021b; Matsui, 2021; Wei, 2020) and facilitates students to support professional-related activities and future learning experiences.

Authentic learning aims to develop cognitive abilities and motivation to learn by promoting values that exist in real life. It also facilitates students to provide different perspectives through collaborative learning in the process. From several previous studies, authentic learning can be summarized into 10 items, namely relevant to real life, contains challenges, contains complex assignments, provides opportunities to complete levers with different perspectives and various sources, encourages collaboration, contains reflection, interdisciplinary perspectives, integrated assessment, and is product-oriented (Ruiz-Madrid & Fortanet-Gómez, 2022; Shier & Van-Du, 2018). Authentic activities provide alternative solutions and results that are very much needed in the learning process. The main focus in authentic learning is the way individuals learn. Students as individuals, if they get the right intervention, can increase their potential knowledge and ability to solve problems (Jiang et al., 2021; Latif, 2021). However, students need teachers to be able to acquire all competencies in authentic learning. Teachers can use a variety of activities to help students gain competence, including providing authentic assignments, providing meaningful and real activities, and designing activities that encourage social interaction (Asi & Karabay, 2022; Pit-ten Cate et al., 2018). Teachers can competently design authentic learning and activities in the learning process if they receive the same training. Therefore, teachers can develop competencies that support their profession through teaching education that is designed based on the principles of authentic learning.

3. Methodology

The methodology section will explain the research design and participants, preparation of research instruments, research procedures, and data analysis. The research instruments prepared include curriculum design, knowledge competency scale, attitude scale, and independent learning ability scale.

3.1 Research Design and Participants

This study uses an experimental research method with a quasi-experimental design to investigate the role of a curriculum designed with authentic learning principles in increasing study success, attitudes toward the subject matter taught, and the ability of independent learning prospective teachers (Wei, 2020). The participants involved were 300 prospective teaching students who were currently studying at their final level. Participants were divided into two groups, namely the experimental and control groups, each with 150 students. All participants were examined to ensure all participants' competencies were at the same level. Examination was carried out through student academic achievement

tests. The preliminary test used an independent analysis of the sample t test to see differences in initial abilities in the pre-test phase.

Table 1. Results of the analysis of the academic competence of the experimental and control groups in the pre-test phase

| Group | N | Mean | SD | df | T | p |
|----------------------|-----|-------|--------|----|-------|------|
| Achievement pre-test | | | | | | |
| Experimental | 150 | 41.34 | 13.526 | 89 | 1.483 | .170 |
| Control | 150 | 40.21 | 14.325 | | | |

Based on Table 1 data, the initial ability of the prospective teachers of the two groups did not show a significant difference in the pre-test phase with a value ($t = 1.489$, $p[0.05]$). So, the two groups have relatively the same initial abilities. There were 150 prospective teaching students in the experimental group with a composition of 75 female students and 75 male students. Likewise, the control group consisted of 150 students with a composition of 75 female and 75 male students. Thus the gender composition of the sample in this study was quite balanced. The average age of prospective teaching students in the experimental group was 23.5 (Min 22, Max 26, SD 1.40), the average age of students in the control group was 23.7 (Min 22, Max. 26, SD 1.23). From these data, it can be concluded that both groups have a fairly equalized distribution in terms of study success rate, gender, and age.

3.2 Research instrument

Several instruments were used in this study to test the effectiveness of a curriculum designed based on the principles of authentic learning on the level of study success, attitudes toward learning, and independent learning abilities. This curriculum development is one of the tasks of the curriculum development course which is then tested on the student teacher candidates. The instrument developed in this research was designed by researchers based on theory. The reliability and validity test of the instrument was carried out empirically and with expert judgment. The following describes some of the instruments used in this study.

3.2.1 Curriculum design

Researchers conducted a review of the literature related to the development of an innovative curriculum related to the implementation of teacher education. Interviews with lecturers who teach development courses were conducted to investigate problems that are often encountered in the education of prospective teachers. Interviews were conducted with 15 lecturers who teach prospective teachers. In the curriculum development process, there are several aspects that are considered, namely the focus of curriculum design, the content being studied, and the teaching methods. The first stage is to identify the educational needs of prospective teachers in developing the curriculum. The second stage involves designing activities starting from content, learning process, and evaluation. In detail, some of the things considered in curriculum design are learning targets, content of material units, tools used, and learning activities (starting from before, during, and after class). Finally, all aspects designed are arranged according to the principles of authentic learning. Also in the process,

the curriculum prepares prospective teaching students to deal with problems that are in accordance with the real conditions of the profession. Curriculum design also helps students to apply prior knowledge. In addition, curriculum development pays attention to several aspects, namely progressivity, continuity, correlation, and coherence. Courses are structured based on the principle of familiar to unfamiliar, from concrete to abstract so that the learning gained is more embedded. Some of the courses included serve as a foundation or requirement for other courses. This is intended so that prospective teachers are able to connect authentic assignments with other subjects. The methods, techniques, and tools used in the learning process are carefully planned. The designed curriculum pays attention to functional, flexible, and applicable characteristics.

3.2.2 Study success test (knowledge of teaching competence)

The success test for prospective teaching students is carried out using multiple choice tests to measure the competency of the knowledge they have acquired (Haghighi Irani et al., 2020; Lim et al., 2020). This test was carried out in the pre-test phase to see initial abilities and tests in the post-test phase were carried out to measure the effect of the intervention. The test consists of 50 questions with the coefficient of reliability being the KR-20 multiple success test using a value of 0.83. The item difficulty index is in the range of 0.41-0.82. Difficulty index is at an average value of 0.55. From the results of this analysis it can be concluded that the item difficulty index shows a normal distribution. Furthermore, the discrimination index item obtains a value of 0.32. Question items with a discrimination index value below 0.30 are not used. From the results of this analysis it was obtained the number of questions, 40 items, that will be used. Items are used to measure cognitive abilities, such as analytical, synthesis, and evaluation abilities. Prospective teachers in both the experimental and control groups took the success test of this study in both the pre-test and post-test phases. All of these test items are used to determine the level of knowledge of prospective teachers who have attended lectures. The research was conducted for four months from pre-test, intervention, and post-test. The minimum score for the study success test is 0 points, while the maximum score is 100 points. All assessment processes are used for research purposes and do not use real identities so as to maintain research objectivity. Subjects used in the study achievement test included curriculum and socialization, problems in curriculum design, curriculum design processes, approaches, identification of needs and targets from cognitive, affective and kinesthetic aspects, and content design and learning process management.

3.2.3 Attitude scale toward curriculum development class

The attitude scale toward the curriculum development class was used to evaluate the attitudes of prospective student teachers toward the curriculum development class (Bennison et al., 2020; Eren & Çetin, 2019). This attitude assessment aims to identify the effects of curriculum design interventions whose learning activities are designed based on authentic learning on the attitudes of prospective teachers in the experimental group. This attitude scale contains three dimensions which contain 20 items. The first aspect is belief in the benefits of curriculum development classes, the second dimension includes the assessment

of curriculum development classes, and the third dimension is the willingness to learn. A 5-point Likert scale is used in this scale from the range of strongly disagree (1 point) to strongly agree (5 points). The scale contains positive arguments. Cronbach's alpha value for the first and second dimensions is 0.92, and the value for the third dimension is 0.75.

3.2.4 Self-learning ability assessment scale

Evaluation of the self-learning ability of prospective teachers is carried out using the self-learning scale adapted from Williamson (2007). This scale has a Cronbach's alpha value 0.97 with a total of 65 items. This self-learning scale uses a Likert scale ranging from point 1 (never) to point 5 (always) and has interval scores of 61 and 302. Score intervals and scale levels are presented in Table 2. From Table 2, it can be interpreted that students showing interval scores of 61 and 142 are those who have low independent learning abilities. Furthermore, students who show scores between 143 and 222 are interpreted as having moderate levels of independent learning ability and show improvement. Interval scores of 223 and 305 are defined as learners who have high independent learning abilities.

3.3 Research procedure

The research begins with the pre-test of the success of the prospective teaching staff involved in the research until the experimental and control groups are formed. At the pre-test stage, an assessment was also made of the teacher's attitude toward the curriculum development class and the ability to learn independently. After all the preliminary data were obtained, data analysis was carried out and a homogeneous group was formed in both groups. The curriculum development class was carried out using an authentic learning approach in the experimental group and a traditional approach in the control class. Researchers were involved in the intervention process in the experimental and control classes and were assisted by lecturers who supported curriculum development. This research was conducted for one teaching semester or six months from the beginning to the end. The topic of learning in the experimental group was set by the teacher with an authentic activity orientation. Collaborative learning was carried out by prospective teachers in the experimental group. In addition, students in the experimental group were given the freedom to choose learning materials for teaching practice. In addition, the learning process was also oriented toward research and inquiry. An example of an assigned research is teacher candidates being instructed to visit schools that have already obtained permits. They conducted interviews with the teachers of the schools visited to find out the problems they experienced in implementing the curriculum at their schools and presented them in class. Collaboration in groups also contributes to discussion skills and finding alternative solutions to problems found in the field.

Table 2. Assessment scale for self-learning learning abilities

| Scale range | Levels of independent learning ability |
|-------------|--|
| 61-142 | low |
| 143-222 | moderate |
| 223-305 | high |

The group of prospective teaching students in the experimental group consisted of 4-5 people. The students prepared interview questions for the information needs of curriculum development and highlighted several aspects including consideration of student needs, problems in implementing the curriculum, and the use of teaching profession theory in supporting the profession. The questions created were discussed with other student groups to investigate the function of the questions. The student teacher candidates went straight to school and conducted interviews. The results of the interviews were transcribed and analyzed to investigate differences of opinion between the difficulties of new instructors and those of existing teaching professionals. In the control group, the majority of lecturers and researchers were active in providing curriculum development materials. The activities of prospective teaching students in the control group were dominated by listening and writing activities. Material that was not understood by prospective teaching students was re-clarified by the researcher. In addition, students in the control group were also given homework every week. Student prospective teachers in the experimental group were instructed to write journals every week. Online journals written by students were then elaborated in class with other students. Student prospective teachers also gave their opinion about the course during the implementation of learning.

3.4 Data analysis

Several data analyses were used in this study, including descriptive analysis (mean, percentage, and standard deviation) independent sample t test, paired sample t test, and repeated measurement ANOVA. All values obtained from the analysis results are interpreted using a significance level of 0.05.

4. Results

The research findings are adjusted to the research objectives. The score of the results of the independent sample t test in the pre-test and post-test phases was used to investigate differences in the success rate of prospective teacher studies in the experimental group that implemented a curriculum developed using an authentic learning approach, while the control group used a traditional approach curriculum. The findings indicate that the two groups showed the same level of knowledge, especially in the curriculum development class. Furthermore, in the post-test phase, an independent sample t test was also carried out to investigate the increase in student study success after receiving intervention in both groups. The average distribution of student study success scores in the two groups in the post-test phase is presented in Table 3. Based on the results of the analysis in the pre-test phase, the score of the study success rate in the pre-test phase did not show a significant difference between the two groups as presented in Table 1 with a value of $t = 1.389$ ($p > 0.05$), whereas in the post-test phase a significant difference was found in the study success rate with

a score $t = 7.250$ ($p < 0.05$). Significant differences in the experimental group in the post-test phase can be seen from the mean value and standard deviation. The mean and standard deviation in the experimental group showed a greater value ($M = 71.82$, $SD = 11.180$) than the control group ($M = 50.25$, $SD = 15.461$). An ANOVA test was also carried out to investigate the increase in student study success scores in the pre-test and post-test phases in the experimental group that received interventions with authentic learning designs and the control group that received curriculum design interventions with traditional approaches. From the results of the repeated measurement ANOVA test, the average value of the experimental group showed the same value from the results of the t test ($M = 71.82$). A significant difference was found in the score of study success in the curriculum development class with a value of $F(1-65) = 28.241$ ($p < 0.001$). From the results of this analysis it can be concluded that a curriculum designed with authentic learning is considered more effective in facilitating prospective teachers to achieve a level of study success. This finding answers the formulation of the research problem.

Table 3. Comparison of the average score of the study success of the teaching candidates of the two groups

| Group | N | Mean | SD | df | T | p |
|-----------------------|-----|-------|--------|----|-------|------|
| Achievement post-test | | | | | | |
| Experimental | 150 | 71.82 | 11.180 | 85 | 7.250 | .000 |
| Control | 150 | 50.25 | 15.461 | | | |

4.1 Comparison of the attitudes of prospective teachers toward curriculum design courses in the two groups

To find out the comparison of attitudes of prospective teachers toward courses in the two groups, an independent sample t test was carried out. Prospective teachers in the experimental group were investigated for their attitude toward curriculum design which was developed based on authentic learning, while the control group was investigated for their attitude toward the traditional curriculum. Comparison of the scores of the two student attitudes in the pre-test and post-test phases of the experimental and control groups is presented in Table 4. Based on the analysis results on the attitude scores of the two groups, no significant difference was found in the pre-test phase. This finding indicates that the two groups have relatively the same attitudes and views on the benefits of a curriculum development design class with grades ($t = -1.430$, $p > 0.05$), ability to assess class ($t = .281$, $p > 0.05$) and willingness to learn ($t = -.913$, $p > 0.05$). However, in the post-test phase, the attitudes of the two groups showed significant differences in the attitude of believing in the benefits of curriculum development classes and appreciating the education and professional training of prospective teachers. A significant increase was seen in the belief in the benefits of the experimental group's curriculum development class in the post-test phase ($t = 2.421$, $p < 0.05$). In addition, the score of the ability to assess the curriculum development class showed a significant difference in the experimental group ($t = 2.457$, $p < 0.05$). Furthermore, the attitude of willingness to learn showed a significant difference in the post-test phase ($t = 2.536$, $p > 0.05$). The prospective teacher's attitude scale score toward this curriculum development class was assessed using a Likert scale with a range of 1-5 from strongly disagreeing to

strongly agreeing. From the results of the analysis, the average attitude scale answers from prospective teachers in the post-test phase showed agree answers, as well as the average answers of the control group in the post-test phase showed agree answers.

Table 4. Distribution of attitude scale scores of the two groups in the pre-test and post-test phases

| Aspect | Group | N | Mean | SD | df | T | p |
|--|--------------|-----|------|-------|----|--------|------|
| Pre-test | | | | | | | |
| Belief in the benefits of curriculum development classes | Experimental | 150 | 3.73 | 1.145 | 85 | -1.430 | .189 |
| | Control | 150 | 3.78 | .789 | | | |
| Ability to evaluate class | Experimental | 150 | 3.91 | 2.483 | 85 | .281 | .792 |
| | Control | 150 | 3.84 | .972 | | | |
| Desire to learn | Experimental | 150 | 3.56 | 1.482 | 85 | -.913 | .373 |
| | Control | 150 | 3.84 | 1.357 | | | |
| Post-test | | 150 | | | | | |
| Belief in the benefits of curriculum development classes | Experimental | 150 | 5.31 | .489 | 85 | 2.421 | .031 |
| | Control | 150 | 4.91 | .891 | | | |
| Ability to evaluate class | Experimental | 150 | 5.42 | .470 | 85 | 2.457 | .052 |
| | Control | 150 | 4.89 | .884 | | | |
| Desire to learn | Experimental | 150 | 4.82 | .872 | 85 | 1.536 | .152 |
| | Control | 150 | 3.12 | .941 | | | |

Furthermore, an analysis was carried out on the independent learning abilities of prospective teachers using the t-test until they met. This analysis was conducted to determine the effect of curriculum design with an authentic approach to the independent learning abilities of prospective teaching students. The results of the analysis of independent learning abilities in the pre-test and post-test phases are presented in Table 5. Based on the results of the t test, it was found that the independent learning abilities in the pre-test phase showed an average value ($M = 224.89$, $SD = 25.153$) and experienced an increase in independent learning in the post-test phase ($M = 251.62$, $SD = 20.421$). From the test results, the ability to learn independently experienced a significant increase from the pre-test to the post-test phase. The level of independent learning ability in the pre-test phase is at a moderate level, while the level of independent learning ability in the post-test phase is at a high level. So, it can be concluded that curriculum development that is designed with an authentic approach makes a positive contribution to the level of independent learning ability, which is highly important when they enter the real world of work.

Table 5. The independent learning ability of the experimental group in the pre-test and post-test phases

| | N | Mean | SD | df | T | p |
|--------------------|-----|--------|--------|----|--------|------|
| Experimental group | | | | | | |
| Pre-test | 150 | 224.89 | 25.153 | 42 | -9.263 | .000 |
| Post-test | 150 | 351.62 | 20.421 | | | |

The level of independent learning ability of prospective teachers in the control group

To investigate differences in independent learning abilities in the control group, paired sample t tests were carried out in the pre-test and post-test phases. The results of the independent learning ability test of prospective teachers in the control group are presented in Table 6. From the results of the analysis of the independent learning ability of the control group in the pre-test phase it showed $M = 229.46$, $SD = 37.641$ and in the post-test phase it was $M = 230.21$, $SD = 14.462$. The results of this study confirmed that there was no significant difference between independent learning abilities in the pre-test and post-test phases of teacher candidates who were in the control group. This is caused by several factors, including the curriculum in the control group adopting a traditional approach with class activities dominated by the activities of lecturers and non-student prospective teachers so that they are passive. The low self-learning ability of prospective teaching students means that they cannot make teaching plans, cannot be responsible for the learning process, and are unable to participate in active learning activities.

Table 6. The control group's independent learning ability in the pre-test and post-test phases

| | N | Mean | SD | df | T | p |
|---------------|-----|--------|--------|----|-------|------|
| Control group | | | | | | |
| Pre-test | 150 | 229.46 | 37.641 | 85 | -.714 | .524 |
| Post-test | 150 | 230.21 | 14.531 | | | |

4.2 Comparison of independent learning ability of the two groups (experimental and control)

A repeated measurement ANOVA test was carried out to investigate significant differences in the independent learning abilities of the teaching candidates of the two groups in the pre-test and post-test phases. The results of the ANOVA test are presented in Table 7. Based on the results of the analysis, it was found that there was a significant difference in the independent learning abilities of the experimental and control groups in both the pre-test and post-test phases [$F(1-65) = 11.531$, $p < 0.05$]. From the results of the analysis, the experimental group showed a more significant increase in independent learning ability compared to the increase in the independent learning ability of the control group teaching candidates. The pre-test value of the independent learning ability of the control group teaching candidates was $M = 221.78$ and in the post-test phase $M = 228.41$. The pre-test value of the independent learning ability of prospective teachers in

the experimental group was $M = 223.50$ and the post-test $M = 245.56$. From these data, it can be concluded that curriculum development based on authentic learning makes a positive contribution to the independent learning abilities of prospective teaching students.

Table 7. Distribution of scores on the level of independent learning ability of both groups

| Source of variance | Sum of squares | df | Mean square | F | P |
|-------------------------------|----------------|----|-------------|--------|------|
| Group (experimental/control) | 1536.423 | 1 | 1536.423 | 2.415 | .173 |
| Error | 47,533.421 | 85 | 740.751 | | |
| Factor 1 (pre-test-post-test) | 11,570.224 | 1 | 11,570.224 | 20.734 | .000 |
| Factor 1*group | 5789.892 | 1 | 5789.892 | 11.531 | .002 |
| Error | 35,571.320 | 85 | 431.756 | | |

5. Discussion

Based on research results, a curriculum developed based on an authentic learning approach makes a positive and significant contribution to the level of study success, students' attitudes toward curriculum development classes, and independent learning abilities, which are very necessary in supporting their profession as teachers. The experimental group showed a more significant increase in these three competencies compared to the competence of students in the control group who used a traditional curriculum approach. The success rate of prospective teacher studies has increased through authentic learning activities and carrying out authentic learning assignments. The findings of this study are in line with several previous studies which confirm that learning settings will be more effective if the dissertation is accompanied by a set of authentic learning activities (Asi & Karabay, 2022; Ruiz-Madrid & Fortanet-Gómez, 2022; Shier & Van-Du, 2018). Authentic activities that facilitate students to gain real and meaningful learning experiences to support their profession in the future will be more beneficial. These findings are also in line with the theory that a curriculum that is designed with a series of knowledge and practices by involving students directly and in accordance with real life will be better able to facilitate achieving their learning goals (Haghighi Irani et al., 2020; Lim et al., 2020).

Another finding from this study is that the benefits of curriculum development classes on the evaluation ability of prospective teachers in the experimental group showed a significant increase compared to the control group (Frank et al., 2021; Portillo & Lopez de la Serna, 2021). The attitude of prospective teachers in the experimental group also changed after receiving intervention from the beginning in the pre-test phase, on average giving answers that changed from agree to change to strongly agree. The control group, both in the pre-test and post-test phases, answered only in agreement. Some of the responses chosen by prospective teachers to the attitude scale are "curriculum development class provides benefits in supporting the profession", "I am very happy with the curriculum development class", and "I like the teaching profession". The control group on average gave less positive answers and only agreed and did not

experience an increase in the post-test phase. These findings indicate that authentic learning in curriculum design can facilitate students to develop a positive attitude toward the learning process they participate in (Bens et al., 2021; Brown Wilson & Slade, 2020). This finding is reinforced by previous research which confirms that learning that promotes hands-on practice with the community will provide meaningful experiences and support the teaching profession (Bennison et al., 2020; Eren & Çetin, 2019).

Authentic learning activities are able to encourage students to be active in the learning process. This authentic activity brings problems faced by professional educators into the classroom, which will encourage students not only to gain new theory or knowledge but also to be able to provide opportunities for students to provide different perspectives through several techniques, including brainstorming, discussion, and collaboration (Mayombe, 2020; Tekian et al., 2020). In addition, some of these techniques can also develop a positive attitude of prospective teachers toward the process of learning activities. A curriculum developed with an authentic learning approach is also able to improve independent learning abilities (Chimbunde & Kgari-Masondo, 2021). The ability to learn independently is the ability of natural individuals to make study plans, be responsible for their learning, and strive to learn independently to support their duties or profession. From the results of the study, an increase in independent learning ability appears when students control their learning activities in the classroom independently and develop (Eisman et al., 2020; Poulton, 2020). This finding of increased self-learning ability is reinforced by previous research which included independent learning ability in the curriculum design for the nursing profession to significantly increase self-learning ability. From the results of this study, student responses in the experimental group that described independent learning abilities included "my learning is my own responsibility", "I can learn without getting instructions", and "I have the freedom to express my ideas and thoughts". These answers indicate that students' independent learning abilities have increased in the post-test phase. In the pre-test phase, the level of independent learning ability is at a moderate level, while in the post-test phase, the ability to learn independently increased at a high level (Mayombe, 2020; Menzi Çetin & Akkoyunlu, 2020). The results of the study show that authentic learning activities in curriculum design can improve independent learning abilities, study success, and the positive attitude of prospective teachers.

6. Conclusion, Implication, and Recommendation

A curriculum developed based on authentic learning makes a positive and significant contribution to the success of the studies, attitudes, and independent learning abilities of prospective teaching students. The increase in study success is seen in students' mastery of pedagogical knowledge and teaching skills. Improvements in the attitude aspect were seen in improvements in student attitudes in the belief in the benefits of curriculum development classes, the ability to evaluate classes, and the desire to learn. The increase in the aspect of independent learning ability was seen in the students' response in taking responsibility for their learning, which experienced a positive increase. Teaching education that uses a curriculum design based on an authentic learning

approach is not only able to improve academic competence, skills, but also able to develop positive attitudes and independent learning abilities that will support their profession as teachers. Teachers must have effective teaching skills so that students can learn effectively. Effective teaching ability can be obtained through quality teacher education, one of which is teacher education using an authentic curriculum. This research has several implications, including teacher education and training should not only focus on knowledge and skills, but must also accommodate the attitudes and independent learning abilities of prospective teachers so that they can improve their abilities independently after completing education. In addition, the educational curriculum for prospective teachers should be designed with authentic learning so that the curriculum is able to facilitate students to obtain real and meaningful learning experiences.

This real experience will improve abilities and skills as a teacher because they are already familiar with the atmosphere of the learning process. This curriculum with an authentic approach is a solution to fill the gap to apply the theoretical knowledge gained into real teaching practice. This study has several limitations, however, including a sample of students who are still not representative, only focusing on mid-level teaching candidates, not optimal in exploring qualitative data to reveal the advantages and disadvantages of an authentic curriculum, and the duration of the research which is still quite short, only one semester. Based on these limitations, the study recommends a number of things including involving prospective teaching students from elementary to secondary teaching candidates, it needs to be strengthened with qualitative data through interviews to get feedback on authentic curricula, and the duration of the research can be carried out longer or longitudinal in nature to reveal more comprehensive data. In addition, the researchers also recommend that curriculum design, especially for teacher education and training, should be preceded by an analysis of the needs of professional teachers, so that prospective teachers are ready to overcome obstacles in the field when they carry out their profession.

7. References

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