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Teaching and Learning Developmental Psychology in the Frame of Anchored Instruction*

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ABSTRACT

Psychology teaching is mostly teacher-centered which can omit students' active learning as reported by the instructors of psychology. In higher education, video-based cases are widely used for students' group discussions in which students are actively involved. Anchored instruction (AI) with seven design principles presents video-based meaningful contexts in which real life problems are embedded. There are limited number of studies embracing such design principles in the area of psychology. In this study, we aimed to utilize three principles of AI to teach psychology via a concurrent convergent design. 50 out of 115 participants registered for an introductory psychology course were assigned to either AI or traditional method (TM) conditions and the remaining were used as controls. We used conventional methods of teaching for the TM group by exposing them regular in-class lectures. On the other hand, the AI group watched a video on a therapy session and had group discussions in addition to in-class lectures. Both treatment groups were tested on related developmental psychology topics in the beginning and at the end of the experiment. Even though the difference was not significant, students in the AI condition scored higher than their counterparts at the post-test. The analyses of final exam scores while controlling midterm scores showed that the AI group significantly outperformed the TM group at the finals. Ingroup discussions from the AI condition revealed that students used their knowledge to solve the problems embedded in the video by referring to expected developmental psychology concepts and processes. In conclusion, this study showed that AI can provide psychology students at higher education an in-depth learning experience which motivates them to study in the long run.

Keywords: Teaching of psychology, educational technology, developmental psychology, higher education, anchored instruction

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1. INTRODUCTION

In higher education, the interest in the field of psychology has grown worldwide. American Psychological Association (APA) reports that about 120,000 psychology bachelor's, 30,000 master's, and 6,500 doctorate degrees were awarded in 2019 (APA, 2021). According to National Center for Educational Studies (NCES), psychology is the fourth field of study among the greatest number of bachelors' degrees conferred in 2016-17 (NCES, 2017). In addition, the employment rate for the bachelor's degree in psychology is 94%, as high as the rates of other popular majors (e.g., computer science, economy) depending on the data of 2011 (APA, 2011). At most of the colleges around the world, students from other fields of study take psychology courses as electives or requirements for the degree. Taken together, thousands of students take psychology courses in higher education worldwide and most psychology graduates take a full-time position at business life right after their graduation. All of these require the analysis of the methods used to teach psychology and their effectiveness.

Academic success in higher education is related to psychological (e.g., self-regulation, self-efficacy) (Kitsantas, Winsler & Huie, 2008; Mattern & Shaw, 2010; Zheng et al., 2002), demographic (e.g., gender, ethnicity)(Zheng et al., 2002), psychosocial (e.g., social support, motivation) (Mishra, 2020; Kappe & Van Der Flier, 2012), environmental (e.g., type of housing) (Zheng et al., 2002) and precollege factors (e.g., high school success)(Easton, Johnson & Sartain, 2017). Similarly, learning in college level psychology course is predicted by psychological factors, prior academic success, and in-class factors (e.g., participation and attendance) (Barber, 2010). While students' interest level about a course is found to be an important predictor of academic achievement (Schiefele, Krapp, & Winteler, 1992), being bored because of unstimulating teaching methods results in low academic success and attendance (Mann & Robinson, 2009). Unfortunately, college students think that most of their courses

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including psychology courses are boring (Mann & Robinson, 2009; Rhoads, Kirkland, Baker, Yeats, & Grevstad, 2021). Research shows that learning environments that include cooperative group work, innovative instructional methods, stimulating tasks are critical in the development and deepening of learner interest (Hidi & Reninger, 2006; Su, 2020). Specifically for psychology courses, students benefit from innovative instructional methods compared to traditional methods (Rhoads, Kirkland, Baker, Yeats, & Grevstad, 2021).

Psychology teaches learners how to solve life difficulties, understand themselves and others, build healthy relationships, learn communication and mental activity of people, and adapt to new environments (Lobza, Korotkova, & Gut, 2020). Its practical value is important thus learners of psychology must be provided with an effective learning environment. One way to do this is to provide a discussion environment where learners can develop their professional communication skills. In particular, discussions on video cases were found to be beneficial for the professional development of students in higher education (Admiraal et al., 2014). Video-supported reflections help students make more precise comments about their works in their future professions. Students can better pay attention to important elements and make connections between theory and practice during these discussions (Rosaen, Lundeberg, Cooper, Fritzen, & Terpstra, 2008). Video-based instructions mostly are utilized in teacher education for teaching pedagogy (Brophy, 2004; Goeze et al., 2014; Zottmann et al., 2013). Yet, video cases can be benefitted in psychology teaching since videos improve students' understanding of theoretical material, students can better imagine professional situations and understand life cases (Shen, Gromova, Zakirova, & Yalalov, 2017). Arbitrarily using videos to teach lessons may not be helpful. Rather, it was recommended that videos for instructional purposes must be inserted within an instructional frame (Blomberg, Sherin, Renkl, & Seidel, 2014). With this information in mind, we used video cases for teaching psychology based on an anchored instruction framework in this study.

According to the Cognition and Technology Group at Vanderbilt (CTGV, 1997), founder of Anchored Instruction, unless students are explicitly asked to use new knowledge they acquire in classrooms, they don't use this knowledge to solve problems. This is called inert knowledge and defined as "...the knowledge that can be recalled when people are specifically prompted to remember it, but that is not spontaneously used to solve problems even though it is relevant" (p.18). Accordingly, newly acquired knowledge becomes useless. Anchored instruction claims that when students learn new information in realistic contexts, they gain knowledge, which can be remembered and easily used in similar real-life situations. Necessary data are embedded within realistic contexts, which are presented in video-based learning environments, and students in groups seek solutions to real-life problems in these videos. As a result, they can see the problems from an expert view and use their knowledge to solve these problems.

Anchored instruction has been found effective in teaching different age groups on different subjects from social development to technology learning (Blackhurst & Morse, 1996; D'souza & Kumari, 2018; Magana, Falk, Vieira, & Reese, 2016; Rieth et al., 2003). To date, studies have paid very little attention on utilizing the anchored instruction framework to teach psychological concepts. Therefore, much uncertainty still exists about the sole and/or combined effects of anchored instruction principles in this area of education. In this study, we aimed to assess the use of anchored instruction in teaching of psychology with a mixed model. We specifically wanted to see whether students learning developmental psychology concepts can use their newly acquired knowledge to engage tactics that an expert may use to solve problems. The expert in this study is a therapist, and we expected students to see the problems from a therapist view. These problems were discussed in a video, which was prepared based on anchored instruction theory.

1.1. Theoretical Framework: Anchored Instruction

Anchored instruction was found by the Cognition and Technology Group at Vanderbilt (CTGV) (1990) to help learners view problems that an expert (e.g., scientist, historian, or mathematician) views and use their knowledge to solve the problems. These problems are encountered in an expert's area of expertise where she/he is required to apply core concepts to solve these problems. According to CTGV (1997), students mostly learn facts teachers teach them in classrooms; however, they do not know how to use this knowledge to solve problems they may face in real-life. Transforming facts into beneficial tools, which can be used for solving problems, is the aim of anchored instruction. In this framework, instruction is situated in a story which is presented with embedded realistic problems and necessary data to solve problems.

Based on anchored instruction theory, learners learn better when information is presented in realistic and meaningful contexts rather than isolated facts (CTGV, 1990). In this theory, the context is presented through a story in a video and learners seek solutions to problems embedded within the story in a group. Accordingly, information they gain from the process stays no longer inert and can be remembered and used easier. Brown, Collins and Duguid (1989) argue that real-life situations, in which learning takes place, support learning. Thus, learners shall be provided authentic and realistic learning activities, in which they can solve realistic problems.

This theory consists of seven design principles: Narrative with realistic problems, embedded data design, video-based format, generative format, links across the curriculum, problem complexity, and pairs of related adventures. In this study, we utilized three of these design principles, which are explained below:

- Embedded data design: Problem situations are presented through meaningful contexts. All the necessary data, including hints and feedback to solve problems, are embedded within these contexts. When learners need to solve problems within these contexts, they need to search for data that are required for the solution. We used this principle because we expected students to use information, they were exposed in their conventional learning, to decide how to solve a real-life situation. They could see how information could be experienced in a real-life case and recall information from memory to solve the problems.

- Narrative with realistic problems: The data required for the solutions to the problems are presented within a realistic and meaningful context. These problems are parts of the story and cannot be considered as isolated and detached from the story. We used this principle because we wanted the students to recognize that what they learn are a part of real-life.

- Video-based format: The story in which problems are embedded are presented to learners in a video. This video is performed by actors, who face realistic problems within the scenario. This scenario represents real-life situations. We used this principle because video allows exact representation of real-life situations so that students can create mental model representation of problem situations.

Anchored instruction has been employed at different age levels from children to adult learning (Allen, 2018). In this theory, real-life scenarios are presented in a constructivist video-based learning environment in which learners solve problems collaboratively (Bransford et al., 1990). These scenarios improve students' critical thinking (Abrami et al., 2015) and increases students' achievement and motivation (Davis, 2018). That is because, the problems used in the anchored instruction framework are meaningful to students (Abrami et al., 2015).

Originally anchored instruction is used to help learners learn mathematics subjects. However, in the literature, different areas are subject to anchored instruction, and teaching different content areas through anchored instruction yields positive results. For example, Magana, Falk, Vieira and Reese (2016) utilized anchored instruction when teaching computer programming. Although it is difficult to learn, it was observed that students' self-beliefs about performing computer programming tasks and their academic performances increased. Presenting computer programming in meaningful and contextualized format contributed to students' learning of computer programming according to the results of the study. Kennedy, Hirsch, Rodgers, Bruce and Lloyd (2017) created videos based on anchored instruction. The videos included practices for teaching linguistic skills for teachers. It was observed that the teachers used the practices more and their students engaged more with the classes in their classrooms. Secondary school students significantly increased their social skills more in a technology-based anchored instruction, which was presented as a collaborative learning space, than a traditional lecture method (D'souza & Kumari, 2018).

In recent studies, anchored instruction framework was employed in improving teachers' pedagogical content knowledge in geometry subjects (Saputra, Ulya, Wahyuni, Rahmadhani, & Hakim, 2020), creating valid and practical digital teaching materials (Susanto & Riyanto, 2020; Susanto & Lestari, 2020), enhancing students' understanding of physics concepts(Malik, Dirgantara, & Muhammad, 2021), supporting students with mathematics learning disabilities (Castillo, 2020), improving students' mathematics performances in special education (Bottge et al., 2015), expanding learners' Chinese speaking skills (Chen, 2019) and teaching reading comprehension for eight grade students with the short videos in reading texts (Indriani, 2020). In most of these studies, anchored instruction was used to improve teachers' technological competency with the creation of anchored instruction-based media and students learning. Teachers teaching practices and students learning were improved in these studies. Additionally, material development was at the core of these studies which tested the effectiveness of these materials. The ones that did not create anchored instruction materials, suggested videos available in internet multimedia sources. Some of these studies used a one-group pretest-posttest design or readily available videos, some didn't clearly explain about the content of the videos. None of these studies are related to the area of psychology, which is the subject to the present study. In contrast to these studies, we created our own scenario on developmental psychology subject, used true experimental design with randomized groups and worked with students taking psychology course for the first time.

In higher education literature, previous research has mostly utilized anchored instruction framework on teacher education (Kariuki & Duran, 2004; Malone & Langone, 2005; Sanny & Teale, 2008; Thomas & Rieth, 2011). We are aware of only one study testing anchored instruction among college students' academic performance. In 1998, Langone and his colleagues compared traditional lecture methods with anchored instruction methods including traditional lectures supported by lecture related video clips. Even though they could not find a group difference on the post-test, the groups were significantly different on their follow-up test scores. However, group performance was dependent on the type of the test. While the anchored group performed better than their counterparts at the multiple-choice test, the traditional method group performed better at the essay tests.

Anchored instruction related methods (e.g., group discussions or watching related videos) have also been used to teach psychology, and previous studies could prove their effectiveness in learning psychology. Specifically, students enjoy active learning, which facilitates and prolongs their learning experience (Dunn, Saville, Baker, & Marek, 2013; Poirier & Feldman, 2007). Furthermore, they benefit from learner-centered active learning more than content-centered traditional methods (i.e., lecture, autonomous readings, and video presentations alone) (Yoder & Hochever, 2005). In addition, both technology use in classes and service activities such as mentoring at-risk youths improve students' learning (Conway, Amel, & Gerwien, 2009; Erwin & Rieppi, 1999; Kretchmar, 2001; Poirier & Feldman, 2007). Relatedly, in 2009, Baker and his colleagues recommended

using the online virtual world in teaching psychology to facilitate learning. These methods are helpful because they require sophisticated cognitive processes such as critical thinking and perspective taking (Anderson, 1992; Perry, Huss, & Mcauliff, 1996). However, it is not always possible to require students to attend service activities as a course assignment because of time concerns and limited accessibility of relevant organizations. In addition, technology use is limited to the instructor's related skills and available technological sources in the institution.

To the best of our knowledge, there are limited number of studies utilizing anchored instruction principles to teach psychology concepts. In the present study, we taught developmental psychology concepts taking the anchored instruction as a framework. We used three design principles of anchored instruction theory as mentioned above and opted out the rest of the principles for the purpose of the study. Our purpose was to show students real life related developmental psychology problems, expected them to recognize and diagnose these problems. Instead of generating new problems and solutions, we expected them to figure out the reasons for the problems mentioned in the video clips. For this reason, we didn't expect them to generate new problems (i.e., generative format principle) and to face the problems that are complex in nature (i.e., problem complexity principle). They saw all the developmental psychology concepts in only one scenario instead of more than one (i.e., pairs of related adventures principle). Additionally, our video included only developmental psychology concepts and not linked to other psychology concepts (i.e., linked across the curriculum principle). In fact, the topics in this subfield of psychology are unique because they include other main subfields of psychology as different areas of development (e.g., cognitive, and social development). Therefore, internalizing developmental psychology concepts can facilitate students' understanding of concepts in other subfields of psychology. In addition, one needs to take account of many perspectives to get a full picture of a developmental stage. For this reason, students assessing problems in a developmental stage would be discussing the effects of multiple factors. This way, anchored instruction techniques in teaching developmental psychology can help students exercise and learn several concepts in a relatively short time.

1.2. Developmental Psychology Concepts

Developmental psychology focuses on humans' physical, cognitive, social and personality development at different stages of life starting from prenatal period to late adulthood (Feldman, 2016; Kail & Cavanaugh, 2016). In this study, we focused on preschool years, specifically cognitive and psychosocial development from birth to age of six. For this period, developmental psychology courses mainly introduce Piaget's and Vygotsky's approaches to cognitive development. While Vygotsky stresses the importance of society and culture in human development, Piaget defines specific cognitive processes humans complete along four developmental stages which are named as sensorimotor (0-2 age), preoperational (2-7 age), concrete operational (7- 12 age), and formal operational stages (12+ age). Basic developmental processes that Piaget identified for children at preschool years are schemas, object permanence, conservation, and egocentrism. The topics on social development for this period include attachment theory (i.e., theories of Ainsworth and Bowlby), Erikson's stages of early psychosocial development, self-awareness, theory of mind, and effective parenting (Feldman, 2016; Kail & Cavanaugh, 2016). This study focused on two cognitive development concepts (i.e., conservation, egocentrism), and two social development concepts (i.e., attachment theory and parenting styles).

"Conservation is the knowledge that quantity is unrelated to the arrangement and physical appearance of objects." (Feldman, 2016, p.170). According to Piaget, children can understand this rule by the age of 7. In this period of age, children also show egocentric thinking tendencies, they cannot take others' viewpoint. As they grow older, they start understanding how the mind operates. In other words, they develop "theory of mind", start understanding that mind and behavior are related, and people can have different desires. Apparently, *egocentric tendencies* end with the development of *theory of mind*. According to Piaget, this happens by the age of 7, but recent research shows that children can have this insight by the age of 4. Even though Piaget's theory made important contributions to the understanding of cognitive development, it lacks emphasis on individual differences possibly originated from genetics and environmental factors.

Attachment is an "enduring socioemotional relationship between infants and their caregivers" (Kail & Cavanaugh, 2016, p.157). By using the procedure called "strange situation", Ainsworth revealed four types of attachment styles, one of which represents secure, and the rest represents different types of insecure attachment (avoidant, ambivalent or resistant, disorganized). This categorization was based on the type and the level of uneasiness infants show at the time they are separated and reunited with their caregivers. Research shows that the more the infants are securely attached to their caregivers, the less they have problems in their relationships during adulthood. Lastly, according to Baumrind, different combinations of parental warmth and control produce four parenting styles (i.e., authoritarian, authoritative, permissive and uninvolved). For example, authoritarian parenting is described by low levels of warmth and high levels of control while permissive parenting is described by high levels of warmth and low levels of control. Each style leads to different reactions among children. In addition, the match between the child's and the parents' personality is critical. Highly sensitive kids raised by authoritarian parents can develop more serious problems compared to their counterparts with low sensitivity (Feldman, 2016; Kail & Cavanaugh, 2016).

Since AI on teaching of psychology has not been investigated comprehensively before and psychology is a broad area with numerous branches, we limited our study on developmental psychology topics covered in an introductory psychology course. Participants of this study were taught lifespan development topics including cognitive, social and personality development for two weeks, as a part of an introduction to psychology course. The ones assigned to the learner-based method (AI) also

experienced a group discussion of a scenario at the end of lectures. Topics embedded in the scenario included main concepts of cognitive and social development of preschoolers. All participants' academic performance on these topics were assessed before and after the lectures on developmental psychology to compare different methods.

We mainly aimed to assess two research questions: Can anchored instruction (AI) methods improve students learning process in the area of psychology? and Can students use the information they learned to solve a problem when necessary? We predicted that students would benefit from learner-centered active learning both in the short- and long-run since anchored instruction theory methods include various active learning processes. Specifically, we expected that students assigned to the lecture-based traditional method (TM) would perform poorer than their counterparts at the learner-based anchored instruction (AI) group in terms of their test scores on selected developmental psychology concepts. We compared not only students' test performance across traditional and anchored instruction conditions, but also qualitatively examined groups' performance in the AI condition.

1.3. Statement of the Problem

Psychology teaching is mostly teacher-centered which can omit students' active learning as reported by the instructors of psychology. Research shows that learning environments that include collaboration, innovative instructional methods, stimulating tasks are critical in the development and deepening of learner interest. Specifically for psychology courses, students benefit from innovative instructional methods compared to traditional methods. In higher education, video-based cases are widely used for students' group discussions in which students are actively involved. Anchored instruction (AI) presents video-based meaningful contexts in which real life problems are embedded. In this study, we aimed to utilize three principles of AI together to teach psychology for the first time in the literature.

1.4. Purpose of the Study

This study aims to assess whether teaching psychology in an anchored instruction framework would yield positive results for students as it does for many other subjects such as mathematics. We limited our study to developmental psychology, which concentrates on humans' physical, cognitive, social, and personality development at different stages of life. Since developmental psychology examines several other subfields of psychology as separate developmental areas, the results of this study can be generalized to other subfields of psychology.

1.5. Problem of the Study

Two research questions to be answered in the study:

1. Does Anchored Instruction (AI) significantly increase students' achievement in learning developmental psychology concepts compared to Traditional Methods (TM)?
2. Can Anchored Instruction (AI) help students learning developmental psychology concepts use their newly acquired knowledge to engage tactics that an expert may use to solve problems?

2. METHODOLOGY

2.1. Participants

We had two treatment groups, AI and TM whose pre- and post-test scores were compared in the first part of the study. We also had a control group whose midterm and final exam scores were used for comparison with the treatment groups. The sample for the study was selected from a total of 115 students registered for an introductory psychology course. The sampling method was convenient sampling, and the participants were students at a public university where one of the researchers works. Out of 115 students, 50 students volunteered for being involved in the treatment groups in the first part of the study: AI and TM. The rest of students agreed for their midterm and final exam results to be used for comparison with the treatment groups in the second part of the study. The sample was 40% male with a mean age of 21, and mainly composed of seniors with 85%. They successfully represented various majors and faculties of the university with 47% from art and sciences, 12% from education, 17% from engineering and 10% from health sciences. All participants reported that they had never taken any psychology courses before the experiment therefore they learned about developmental psychology concepts during this experiment as a part of an introductory psychology course. While both treatment groups of the study were given extra credit for their participation, other students were given the opportunity to complete an assignment to be able to earn the same credit. Thus, participating in the study and being in one of the treatment groups were completely voluntary under no obligation.

2.2. Design

One of the mixed research methods, a concurrent convergent design approach, was used in this study. We randomly assigned the volunteers to one of the treatment groups (AI vs. TM) and only one of these groups was exposed to the independent variable, the anchored instruction manipulation (i.e., watching a movie and having a group discussion) therefore a true experimental design was utilized for the quantitative part of the study. To collect data, the participants took a pre-test and then were randomly

assigned to one of the experiment conditions (i.e., anchored group and traditional group). As soon as the experiment was completed, the students completed a posttest to reveal the differences between the groups. In this introductory course, students' performance was assessed depending on one midterm exam given before the experiment and one final exam given after the experiment. With the permission of the instructor, group differences at and across these exams were also tested. See Figure 1.

For an in-depth analysis of students' learning experiences, a case study design approach was utilized for the qualitative part of the study. To collect qualitative data, students in the AI group were asked to take notes during group discussions they had after each video clip. We then analyzed their notes via descriptive approach.

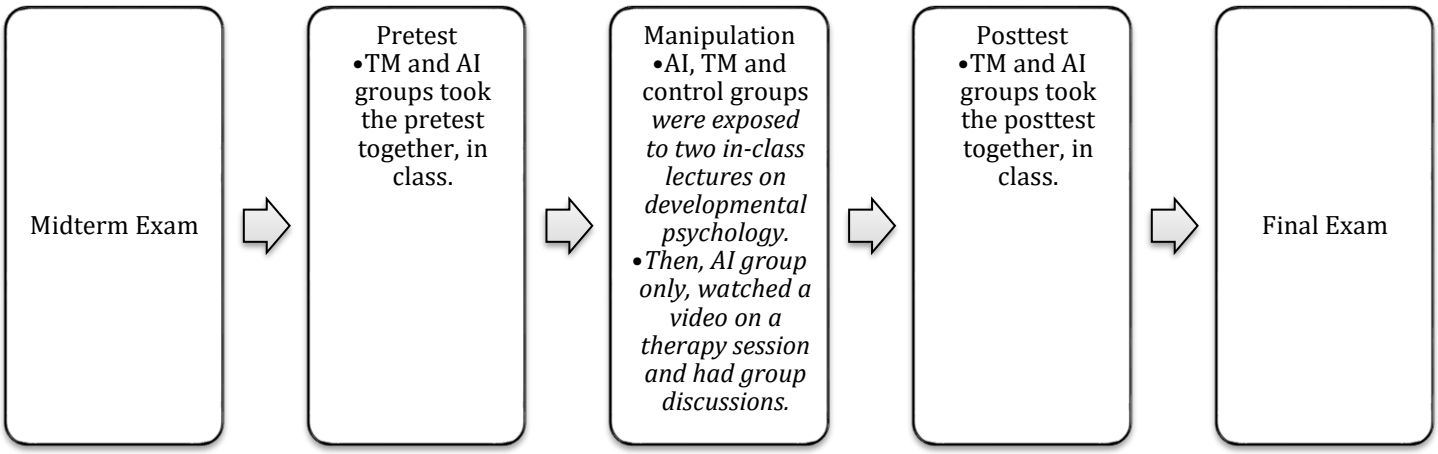

Figure 1. The design of the study

2.3. Materials

2.3.1. The scenario and the video

Researchers identified main developmental psychology topics depending on introductory psychology books and wrote a scenario on a mother discussing her concerns about her 5-year-old daughter's cognitive and psychosocial development with a therapist. A developmental psychologist in the psychology department reviewed the scenario and approved that it appropriately covered basic topics of cognitive and psychosocial development. Two female undergraduate psychology students volunteered to take a role in the video. The video was composed of four video clips with a duration of 6 minutes for each. Each part was devoted to one or two developmental psychology concepts.

First two parts of the video were on *cognitive development.* In the beginning, the mother complained that her daughter could not understand that the change in physical appearance of a material does not affect its quantity. To support her claim, she gave some examples where she compared her daughter's performance with the performance of her peers attending kindergarten or living in rural areas. Then, by referring to a game she played with her daughter before she was four, she complained that her kid could not take the perspective of others; she had assumed that others think in the same way she had. The last two parts of the video were on *social development.* The therapist asked the mother to describe their relationships as a family. The mother discussed their experiences in the first years of motherhood illustrating potential causes and signs of insecure, specifically avoidant attachment. Lastly, she mentioned how her husband and she punished their daughter when she had not respected their strict rules. In summary, in the video, the mother addressed different developmental psychology concepts without labeling them, in the following order: conservation, egocentrism, avoidant attachment and parenting styles. The therapist only listened to the mother and asked questions; she did not make any comments or diagnoses.

The video included the conversation between the mother and the therapist. The mother visits the therapist, and the conversation takes place at the therapist's office. To support the mother's arguments, we embedded some pictures representing the kid's moments in the video. For example, in one she points to a playdough cylinder placed next to a round one on the table, illustrating the conservation rule. In another picture, we showed her playing with her dad with an unhappy and uninterested expression, as an example of avoidant attachment. Our purpose here was to support students' understanding of the mothers' explanations about her daughter's situation. As a result, we expected a better understanding of the psychology concepts for the participants.

2.3.2. Pre-test and post-test

A multiple-choice test was developed by the researchers to use as both the pre- and post-test. This test had items related to development psychology concepts, which were subject in the videos. At first, we prepared 30 questions representing different developmental psychology topics. For the validity of the test, an expert in the psychology area was asked for her opinion about the test items. After revision, 200 students who took the introductory psychology course one-year ago, completed the test in

groups of 50. Depending on students' performance on the tests, we removed three items which were too easy (with the value of .80 and above) or too difficult (with the value of .30 and below), then we added six new questions. We also removed items generally longer than other question formats which might affect students' performance. As a result, we had a 33-item test to apply both as a pre- and post-test. There were seven questions for each concept (i.e., attachment, egocentrism, conservation, parenting styles), and five questions on other concepts of Piaget's theory of cognitive development (e.g., accommodation, assimilation, names of the stages). Another group of students (n = 45) who took the course before were given the last version and inter-item reliability was acceptable with a Cronbach's Alpha score of .79.

2.4. Procedure

In the beginning of the semester, the researcher introduced the study in class, to the students registered for an introductory psychology course available for departments other than psychology.

In this class, developmental psychology topics were issued for two weeks with 6-hours in total, in the middle of the semester after the midterm. Therefore, students took the pre- and post-test with a two-week interval. In the beginning of the first week, students were reminded by the study via email. That week, the instructor provided the researcher about 20 minutes to give the pretest to the volunteers in the beginning of the class.

We aimed to control academic success when assigning students into conditions and AI discussion groups. Volunteers were randomly assigned to either traditional lecture method (TM) or anchored instruction method (AI) conditions after the pre-test. T-test analysis showed that mean scores of the two groups at the midterm were not significantly different, $p < .05$. Then, we used the matched-group method to be able to create five AI discussion groups depending on students' midterm scores. The scores of the AI group were listed from the lowest to the highest and the list was separated into 5 categories as *very low,* scores ranging from 47-56; *low,* scores ranging from 57-64; *moderate,* scores ranging from 68-79; *high,* scores ranging from 81-86; *very high* scores ranging from 87 to 99. Each score in each category was randomly assigned to five different discussion groups. The mean midterm score for each AI group was as follows, 73.3, 72.4,74.2, 71 and 73.

Independent from the experiment, the instructor showed all students (i.e., treatment and control groups) some YouTube videos related to the developmental psychology topics as a part of her lectures. For example, in one video, there was a researcher testing the conservation rule with two kids younger than five separately, using pennies and food. In another one, different attachment styles were illustrated by the reactions of three kids to the separation from and reunion with their mothers separately.

In the second week, when the instructor finished the topics, all students took a 5-minute break. Then, participants in the AI condition were seated with their group members after the TM group completed the posttest and left the classroom. They were instructed to watch four video clips on a woman sharing her concerns about her daughter's development with her therapist (see Figure 2). The experiment was completed in the classroom where the lectures took place; it was a quiet place at one of the university buildings, with enough lights and no distractions coming from outside. The video clips were 6-minute long each which made the participants not get bored or lose attention. The video clips were projected on a wall of the class and speakers' volume was turned up so that the participants could watch the videos and properly listen to the conversations. All the groups in AI condition were asked to watch each video clip and take notes when they needed. They were also asked whether they would prefer to re-watch the videos. After each part, the groups were given five minutes for in-group discussions before they shared their ideas with other groups under the supervision of the researchers. During in-group discussions, they were asked to put themselves in both the mother's and the therapist's shoes and discuss the problem situations from two different perspectives while one group member was taking detailed notes. They would discuss what they would say if they were the therapist or the mother. When this part of the study was completed, participants took a 5-minute break and then completed the posttest. The whole procedure (i.e., presentation of the videos and group discussions) took almost an hour. Not the TM group, but the AI group watched the videos, had group discussions, and shared their ideas with their classmates in addition to the lectures. Thus, they collaboratively participated in a learning activity, which was claimed to have advantages over individual learning activities in the literature (Yoder & Hochever, 2005).

Figure 2. Students at the Anchored Instruction condition watching the video clips

2.5. Data Analysis

Participants' scores were analyzed both quantitatively and qualitatively. Quantitative analyses were run in two phases. In the first one, we compared two treatment groups (i.e., AI and TM groups) based on the difference between their pre- and post-test scores. In the second phase, we compared three groups (i.e., AI, TM, and control groups) based on their midterm and final exams. Specifically, we tested the intervention effect depending on the increase in students' scores from midterm to final exam, as an alternative for pre- and post-test comparison. We used ANCOVA analysis by using pretest scores as the covariates. ANCOVA combines ANOVA and regression, determines correlation between the covariate and dependent variables (Rutherford, 2011). We used students' pretest scores as covariates in this study "to (a) reduce the error variance and (b) eliminate systematic bias" (Dimitrov & Rumrill, 2003, p.161). ANCOVA test controls for students' pretest differences in both groups and adjusts the pretest score differences in the groups while comparing their posttest scores (McMillan, 2012). For these reasons, we wanted to have more powerful results in this study by using ANCOVA test to analyze the quantitative data. In conclusion, we completed two main quantitative analyses using two different datasets (i.e., an ANCOVA with posttest scores and an ANCOVA with final exam scores) which helped us control the Type I error.

For qualitative analyses, the notes that AI students took during group discussions were collected. They were coded and analyzed with a descriptive analysis by the researchers. The themes were determined as the psychology concepts given in each video (e.g., cognitive development stages of Piaget, attachment styles). The researchers independently coded students' notes and then their codes were compared. We used the Miles & Huberman Formula (1994) for inter-rater coders' reliability: Number of Agreements / (Number of Agreements + Disagreements). Depending on the Miles & Huberman Formula, the inter-rater coders' reliability coefficient was found to be 0.73, which was acceptable (Whitley & Kite, 2013). Frequency and percentage tables for each theme were calculated and summarized in tables (see qualitative analyses section).

3. RESULTS

3.1. Quantitative Analyses

3.1.1. Comparison of the groups' achievement: anchored instruction vs. traditional instruction

As a requirement of parametric tests, we tested whether the sample meets the assumptions of homogeneity of variance and normal distribution. Kolmogorov-Smirnov test indicated that both pre- and post-test scores were normally distributed for each condition, $D_{TMpretest}(25) = 0.09$, $D_{AIpretest}(25) = 0.11$, $D_{TMposttest}(25) = 0.12$, $D_{AIposttest}(25) = 0.12$; $p = .20$ for all. In addition, Levene's test indicated equal variances for both post- (F = .02, p = .89) and pre-test scores (F = .40, p = .53) of two groups. Independent groups t-test analysis revealed that pre-test scores of each condition was not significantly different although participants of the TM condition started with a higher score ($M = 15.16$, $SD = 5.51$) than the AI group ($M = 12.84$, $SD = 4.88$). To determine whether participants assigned to the AI condition performed better than the ones in the TM condition at the posttest, we used ANCOVA analysis by using pretest scores as the covariates. Even though posttest scores of the AI group ($M = 24.2$, $SD = 5.26$) was higher than the TM group's scores ($M = 23.17$, $SD = 5.75$) as expected, this difference was not statistically significant, (F [1,47] = 1.74, $p = .19$, partial $\eta^2 = .04$).

For the second phase of the analyses, we compared three groups of students, the AI, the TM and the control group, in their understanding of psychology concepts based on their midterm and final exam scores via separate factorial ANOVA analyses. The midterm topics included introduction of different branches of psychology, research methods, brain and nervous system, learning, memory, and health psychology. The final exam topics included developmental psychology, social psychology, personality, and abnormal psychology in addition to topics covered in the midterm. Results show that three groups were significantly different in their midterm (F [2,114] = 6.21, $p = .003$) and final exam scores (F [2,114] = 4.40, $p = .01$). Tukey test showed that the control group ($M = 56.05$, $SD = 31.43$) scored significantly lower than the AI ($M = 72.64$, $SD = 15.06$) and the TM groups ($M = 73.4$, $SD = 14.08$) at the midterm. Midterm scores of treatment groups were not significantly different as mentioned in the procedure section. For the final exam, the control group ($M = 48.95$, $SD = 32.85$) scored significantly lower than the AI group ($M = 68.20$, $SD = 14.76$) only. The TM group's final exam scores ($M = 57.66$, $SD = 23.75$) were placed in between the control group and the AI group, and their scores were not significantly different from the other two groups. To sum up, even though TM and AI group members started the experiment with similar exam scores, the AI group increased their scores by the end of the semester as a result of anchored instruction manipulation. To ascertain this argument, we compared treatment groups' final exam scores to see whether the treatment groups have improved their understanding of introductory psychology concepts differently. In addition, using the same test as the pre- and post-test might have been effective for both groups' non-significant results above. Therefore, this comparison would be an alternative in testing the group difference. We used ANCOVA analysis by using midterm scores as covariates. Before running ANCOVA, we checked the assumptions of ANCOVA analysis. Levene's test for equality of variances was not violated F [1, 48] = 23.12, $p = .12$) and there was not a significant interaction effect between midterm scores as covariate and the treatment groups (F [1,48] = 1.69, $p = .19$). Thus, the assumptions were met. Results of ANCOVA analysis taking midterm scores as covariate showed that there was a statistically significant difference between the final scores of the groups (F [1,47] = 4.22, $p = .04$, partial $\eta^2 = .08$). The AI group had significantly higher final scores ($M = 68.20$, $SD = 14.76$) than the TM group ($M = 58.06$, $SD = 23.66$).

3.2. Qualitative Analyses

The AI groups took notes during in-group discussions and the researchers collected them to better assess groups' references to related developmental concepts. Researchers as independent coders used descriptive analysis when analyzing the groups' notes. In the following sections, results of the researchers' assessments and the English translation of a sample of notes students took during their discussions will be presented.

3.2.1. Conservation in Piaget's developmental stages

Table 1 shows that students' inferences from the first video varied from conservation task, the effects of environmental factors, genetics and individual differences, age range of developmental stages, cognitive development, Piaget and preoperational stage. Almost all groups could label the task as "conservation" and successfully recognize that the child did not have a cognitive problem by attributing her low performance to environmental factors and/or individual differences. They could also make references to several other concepts related to cognitive psychology as seen in Table 1. Some of their comments are as follows:

> *Children cannot develop the idea of conservation between the ages of 2 and 7 according to Piaget. Therefore, it is very normal that your child shows that kind of reaction (Group 2). Children raised in rural areas play with mud more often, therefore they could notice the difference between two pieces of mud (Group 5). According to Piaget, children don't have the idea of conservation between the ages of 2 and 7 at the preoperational stage (Group 3). Cognitive development can vary among individuals, so it is normal that your 5-year-old kid could not develop this skill compared to her peers (Group 1). Environmental factors: there are more options in towns to get experience (Group 4).*

Table 1.
Students' Answers in the Idea of Conservation in Piaget's Developmental Stages

Cognitive development (theme) **Conservation task (category)**			
Codes	***f***	**%**	**GR#**
Conservation	4	19.05	G1, G2, G3, G5
Environmental factors	4	19.05	G2, G3, G4, G5
Age range	3	14.28	G1, G2, G3
Individual differences	3	14.28	G1, G2, G3
Cognitive development	2	9.52	G1, G4
Piaget	2	9.52	G2, G3
Pre-operational Stage	2	9.52	G3, G5
Genetic factors	1	4.76	G2
Total	21	100	

3.2.2. Egocentrism in Piaget's developmental stages

Students' inferences from the second video varied from egocentrism, Piaget, age range of developmental stages, theory of mind, pre-operational stage and the effects of individual differences, as can be seen in Table 2. All groups could label the child's tendency correctly (i.e., egocentrism) and attributed her cognitive errors to the age range of developmental stages. Importantly, some of them could connect *theory of mind* with *egocentrism*, and even could name related developmental stages (i.e., preoperational stage). Some of their comments are as follows:

> *Egocentrism is dominant* (Group 5)*. Children can overcome egocentrism between the ages of 7 and 12, therefore it is normal that a child between the ages of 2 and 7 behaves in a self-centered manner* (Group 2)*. The child has not developed the theory of mind* (Group 3)*. Egocentrism is normal between the ages of 2 and 7* (Group 1)*. If egocentrism continues after the age of 7, the child should be assessed again* (Group 4).

Table 2.
Students' Answers in the Idea of Egocentrism in Piaget's Developmental Stages

Cognitive development (theme) **Egocentrism (category)**			
Codes	*f*	%	GR#
Egocentrism	5	31.25	G1, G2, G3, G4, G5
Age range	5	31.25	G1, G2, G3, G4, G5
Theory of mind	2	12.5	G2, G3
Pre-operational stage	2	12.5	G3, G5
Individual differences	1	6.25	G2
Piaget	1	6.25	G2
Total	16	100	

3.2.3. Attachment styles

Table 3 shows that students' inferences from the third video varied from insecure attachment, avoidant attachment, lack of love and attention, frequent change of the caregiver, early separation from the caregiver, the importance of physical contact, and the effects of childhood attachment to adulthood. All groups could label the kid's attachment style correctly and recognize possible reasons and signs of insecure attachment (i.e., lack of love and attention, frequent change of the caregiver, early separation from the caregiver). Unexpectedly, one group suggested the family build more physical contact in their relationships; another one cautioned them about the transition of negative effects to adulthood. Some of their comments are as follows:

> *The girl is attached to the mother with an insecure and avoidant style* (Group 2). *The kid shows no interest when separated and reunited with her mom, so it is avoidant attachment* (Group 5). *Secure attachment processes might fail because they changed the nanny often* (Group 4). *The lack of love and care because of a neglectful dad and a working mom can be risk factors for personality related- and psychological-problems in the future* (Group 1). *Because the baby separated from the mom when she was two months old, she was insecurely attached* (Group 3).

Table 3.
Students' Answers in Attachment Styles

Psychosocial development (theme) **Attachment styles (category)**			
Codes	*f*	%	GR#
Insecure attachment	5	21.73	G1, G2, G3, G4, G5
Avoidant attachment	5	21.73	G1, G2, G3, G4, G5
Change of caregiver	4	17.39	G1, G2, G3, G4
Lack of love/attention	4	17.39	G1, G2, G4, G5
Early separation	3	13.04	G1, G3, G5
Physical contact	1	4.35	G2
Effect on adulthood	1	4.35	G3
Total	23	100	

3.2.4. Baumrind's parenting styles

Students' inferences from the last video varied from authoritarian and democratic parenting, different combinations of parental warmth and control as the core of different parenting styles, importance of the match between temperaments of the kid and the parents. All groups could correctly label the parenting style with proper referral to the levels of warmth and control. Even one group could indicate a specific but important information in terms of effective parenting: the importance of match in temperaments.

Table 4.
Students' Answers in Baumrind's Parenting Styles

Psychosocial development (theme) **Parenting styles (category)**			
Codes	*f*	%	GR#
Authoritarian parenting	5	29.41	G1, G2, G3, G4, G5
Warmth/ Responsiveness	5	29.41	G1, G2, G3, G4, G5
Control/Demand/Punishment	5	29.41	G1, G2, G3, G4, G5
Match btw style and need	1	5.88	G5
Democratic parenting	1	5.88	G1
Total	17	100	

Some of their comments are as follows:

> *This is an example for the authoritarian parenting style* (Group 1). *Authoritarian parenting, high control and demand, low support, and warmth* (Group 2). *Set rules which are flexible and adaptive to the child's needs* (Group 4). *High pressure and punishment can make the child either passive or rebellious* (Group 3). *A match between the parent and the child is important. A sensitive child should not be raised by authoritarian parents* (Group 5).

In conclusion, even though quantitative analyses comparing the AI and TM groups did not reveal significant differences, qualitative analyses of the notes that students took at in-group discussions showed that all groups in the AI condition could comprehensively make referrals to the related concepts. They could successfully label the related developmental psychology concepts embedded in the video and even provide additional related information which was important to consider during treatment.

4. DISCUSSIONS AND IMPLICATIONS

4.1. Discussions

In this study, we utilized an anchored instruction framework on college students' learning of developmental psychology concepts. Volunteers for the treatment conditions randomly assigned to either the AI or the TM group via matched-group method based on their midterm exams. They completed a pre-test in the beginning of the study and were exposed to the lectures on developmental psychology for 6 hours in total within two weeks. At the end of the second week, while the TM group only completed the post-test, students at the AI condition had group discussions on a video designed to illustrate developmental psychology concepts based on the anchored instruction framework and then completed the post-test. Results showed that students in the AI condition improved their scores more than the TM group did, from pre- to post-test. However, the difference was not significant. Yet, the AI group had significantly higher scores than the TM group in the final exam consisting not only of the developmental psychology concepts which were covered in the videos, but also other psychology concepts. Qualitative analyses of group discussions revealed that all groups could make referrals to the related concepts and even provide additional information that the therapist should take into account before making diagnoses and start the treatment.

Although not significantly different, the AI group had better improvement from the pretest to posttest than the TM group. Apparently, students in the AI group gained better understanding from the experiment condition by making inferences from the videos. As a result, they improved their pretest scores. This result is consistent with earlier studies in favor of anchored instruction (Bottge et al., 2015; Bruce and Lloyd, 2017; Castillo, 2020; Indriani, 2020; Magana, Falk, Vieira, & Reese, 2016; Malik, Dirgantara, & Muhammad, 2021). It is crucial to mention that the videos prepared in the frame of anchored instruction did not teach the concepts as in traditional teaching methods. The videos did not transmit knowledge "from expert to novice" (CTGV, 1993, p.52), which is called micro contexts. On the contrary, the students were presented with a realistic context, macro context", which allowed students to construct knowledge in a meaningful and realistic story context. Accordingly, teaching and testing, which was only the case for the TM group, did not work well for these students to construct knowledge. However, one may argue that the students already were taught the developmental psychology concepts and thus they were well aware of the mother's complaints in the videos prepared based on anchored instruction. This situation also was mentioned in CTGV (1993) study that the videos let students administer what they already know. Being involved in a group discussion helped them better understand and comment on the developmental psychology concepts. Discussions on video cases are beneficial for the professional development of higher education students (Admiraal et al., 2014). Students can better pay attention to important elements and make connections between theory and practice during these discussions (Rosaen, Lundeberg, Cooper, Fritzen, & Terpstra, 2008). Thus, students' learning went beyond the drill and practice method and added another dimension to their learning in the AI condition.

As required, all students taking introductory psychology courses took midterm and final exams. The final exam included not only the topics covered in the videos, but also additional topics covered in introductory psychology courses, as mentioned earlier. Results showed the AI group had significantly higher final scores than the TM group. As supported in the literature, anchored instruction increases students' achievement and motivation (Abubakar et al., 2017; Davis, 2018; Hartanto & Reye, 2019). Accordingly, this result might be attributed to the AI participants' motivation as they may have developed positive attitudes towards psychology concepts in general. One of the hypothesized benefits of video-based format in Anchored Instruction is that it is more motivating (CTGV, 1997). Considering adults' interest, attention, responsibility, and motivation are part of the learning process (Wlodkowski & Ginsberg, 2017), we can claim that participants in the AI group may have developed interest in psychology concepts and responsibility to study better for the final exams. Accordingly, they got higher scores. Because the TM group did not receive video and did not have an opportunity to discuss concepts covered in the videos, they neither improved their scores from pretest to posttest nor from midterm to final. It means that the videos not only improved the AI groups' understanding of developmental psychology concepts, but also the videos improved their motivation to learn psychology concepts in general. Accordingly, the AI group improved their scores significantly better than those in the TM group.

From in-group discussions at the AI condition, we observed that the students had the tendency to be the therapist and reasoned the mothers' act from the view of the therapist. This situation was covered by the anchored instruction (CTGV, 1997). The students behaved as if the therapist, the expert, who were required to use the core concepts to diagnose the problems the mother was complaining about. We can claim that the video cases improved students' understanding of theoretical material. Accordingly, students better imagined professional situations, understood life cases (Shen, Gromova, Zakirova, & Yalalov, 2017) and approached problems from different perspectives (Rabinowitz, 2020). In addition, all the necessary data was presented in the mothers' speech in the video, which is the embedded data design principle within the anchored instruction framework. Embedded data design allows students find relevant information within the scenarios (CTGV, 1992). The results showed that the students were able to use the required data from the conversation between the mother and the therapist and talked about the developmental psychology concepts. Furthermore, even though the therapist did not make any comments about the child's behaviors and whether these behaviors were normal, students could label related concepts necessary for the diagnoses and the treatment. Within the narrative design principle of anchored instruction, students had the opportunity to see the connection between psychology concepts, which are taught as isolated facts, and real life in conventional learning. This result too was supported by anchored instruction that students can engage in reasoned decision making in these learning environments (CTGV, 1992).

During the experiment stage, students watched the videos, prepared in the frame of anchored instruction. In these videos, developmental psychology topics were not explicitly taught. As mentioned earlier, the purpose of anchored instruction is to help learners view and solve problems that an expert view and solves these problems (CTGV, 1997). The students in this study viewed and revealed the possible reasons for the issues mentioned in the videos. For instance, for the idea of conservation in Piaget's developmental stages, the students explained the conflicts for the mother's concerns. They clearly indicated that the child was not old enough to develop the idea of conservation by making referrals to the age range of Piaget's developmental stages. They even criticized strict limits of these stages by making referrals to environmental factors and individual differences. Students could take all related perspectives into account to successfully evaluate the case (Feldman, 2016; Kail & Cavanaugh, 2016). Accordingly, this result can be explained by the fact that videos framed around a learning theory for instructional purposes, in the frame of anchored instruction in this study, help students make referrals (Blomberg, Sherin, Renkl, & Seidel, 2014).

Students were observed that they could make inferences from the videos to the developmental stages which were implicitly given in the videos. For instance, the videos taught neither Baumrind's parenting styles nor Ainsworth's attachment theory, but the participants could refer to the composites of these theories. When the mother mentioned strict rules and punishments, students could label the parents as authoritarian and defined this style with low levels of warmth and high levels of control. Additionally, they could identify early separation with the mother and frequent change of the caregiver as the possible signs of insecure attachment. Furthermore, they could label the child as avoidantly attached, because the mother stated that her daughter had been indifferent to their attempts to be close. All these concepts were hidden within the mother's and the therapist's conversation and the students were required to make inferences from these conversations to identify them. To sum up, during the AI method, students could make necessary connections to solve the case. From an authentic learning perspective, anchored instruction includes strategies to abstract knowledge, which yields to the decontextualization of knowledge from learning (Mattar, 2018). That helps the transfer of knowledge requiring students to have contextual and structural understanding and to comprehend underlying concepts (Wells & Le, 2017). Accordingly, it can be claimed that the students in this study could use their knowledge from formal education to decide, label and transfer in another context and understand underlying concepts. Transferring knowledge requires deep understanding of context in which problem is given, according to Deans for Impact (2015). As a result, deep learning has occurred, and the students understood the context well presented in the videos prepared based on anchored instruction in this study.

4.2. Implications

This study showed that psychology students at higher education can benefit from anchored instruction both in the short and long run. As we have mentioned above, developmental psychology topics include other main subfields of psychology as different areas of development (e.g., cognitive and social development). Therefore, as students successfully learn developmental psychology concepts, they can more easily understand the concepts in other subfields of psychology. For example, in this study, students could link egocentrism and theory of mind, and this is the basis of cognitive psychology topics such as learning and metacognition. Students could also stress the importance of individual (i.e., genetics) and environmental factors as an explanation for individual differences. All subfields of psychology place emphasis on these criteria, from the stress-diathesis model in clinical psychology to other theories in industrial, health, personality, and social psychology. In addition, students could combine many clues embedded in the story to reach the big picture. This approach will help the students better analyze the dynamics in their lives and psychological cases presented in the courses they will take.

Based on the findings of this research, we can imply that AI can be also used in higher education in general and it is beneficial. In the scope of anchored instruction, students in higher education can administer what they learn to new concepts, see the connections between their subject area and real life, and evaluate what they learn. In addition, AI can increase students' motivation in their subject area in general and may arouse interest in their subjects. Using AI, students in higher education can gain in-depth learning experience. In other words, they can connect different parts of a course topic to make conclusions and solve problems both in the short and long run. Thus, the use of AI should be expanded in higher education.

5. CONCLUSION AND LIMITATIONS

The field of psychology is one of the most studied field with the highest employment rate in the world. This field is also important because it teaches solving struggles in life, understanding others, building healthy relationships, and adapting to new environments. Accordingly, it requires a special attention to teach psychology. More importantly, as students' academic success is highly related to their interest and motivation in a subject, innovative instructional methods are mostly more helpful for students than conventional methods. In the literature, discussions on video-based scenarios are recommended in the field of psychology. However, the videos which are based on instructional theories are shown to be more effective. In this study, we used anchored instruction as a theoretical framework while creating video-based scenarios for the learners of psychology which received very little attention in the literature. Anchored instruction uses real-life scenarios with the problems embedded within the scenario which includes all the necessary data to solve problems. This study was unique in testing anchored instruction with a mixed model in teaching of psychology. Specifically, we utilized three of the design principles of anchored instruction: Embedded data design, narrative with realistic problems, video-based format.

Even though the quantitative analyses comparing the performance of the AI and TM groups on the posttest did not reveal a significant group difference, the AI group scored higher than the TA group on the posttest. Moreover, the AI group significantly scored better than the TA group on the final exam. In addition, when we qualitatively analyzed the content of group discussions held as a part of the AI condition, we observed that the participants made inferences from the conversations between mother and therapist in the videos. Participants used different psychology concepts, which were not explicitly taught or mentioned in the video to diagnose the mother's situation from an expert, a therapist, view. Moreover, the participants provided more information that we did not expect. For example, in terms of family relationships, referrals to the types of and sources for insecure attachment and parenting styles were expected but neither the personality match between child and the caregiver nor the effects of attachment security to adulthood were. Participants provided extra information for the therapist's potential diagnoses and made connection between theory and practice, and consequently their learning went beyond conventional learning. This is an indicator that the group discussions on the videos helped them for their professional development.

In line with the hypothesized benefits of anchored instruction, participants were able to find relevant data to diagnose the mother's complaints about her child. This data was not explicitly given but rather was hidden in the conversation and allowed the participants to make their own decisions in revealing possible reasons of mother's concern. Aligned with the relevant literature on anchored instruction, we believe participants were more motivated and comprehended the context provided in videos and, as a result, improved their understanding of the mother's situation in AI condition. They developed interest and responsibility in psychology concepts, improved their understanding and labeled necessary concepts without the therapist's comments about the child's behavior.

Since participants made comments, diagnoses, labeling and inferences about the implicit information in the videos, we think that they used their knowledge from the conventional classroom activities, transferred their knowledge into the anchored instruction scenarios. As it requires having a contextual and structural understanding and comprehending underlying concepts, students in the anchored instruction condition showed that they gained deep learning. Accordingly, instead of traditional teaching methods, anchored instruction-based video cases can help learners of psychology to learn better and develop positive attitudes towards psychology concepts.

While limiting the study on developmental psychology to better control confounding variables, students' performance on learning cognitive- and social-development concepts were assessed. Therefore, the results of this study can be generalized to other subfields of psychology.

Due to practical constraints, this paper cannot provide a comprehensive review of the effectiveness of the AI method in teaching of psychology. First of all, as a possible reason for the non-significant effect, we had only 50 students in the treatment groups for this study leaving 25 students in each condition. Future studies should test the same effect by using more participants. In addition, it would be better to include a third group with whom the researcher shares the text and ask them to assess the scenario personally. In other words, there would be neither a group process nor a video exposure. With the help of this condition, anchored instruction method could be assessed on teaching of psychology.
As mentioned earlier, the instructor used YouTube videos to illustrate developmental psychology concepts during lectures. This might weaken the effect of AI method, strengthening the learning experience for all students. Future studies should replicate this study by assessing the effect of course formats with different degrees of visual illustrations. The solution of these problems probably increases the strength of the relations. Then, researchers can continue testing the AI method for other subfields of psychology.

Lastly, we collected data from a specific sample consisted of Turkish college students registered at a psychology course opened at Hacettepe University in Turkey. The characteristics of the lecturer and the students, the cultural norms and education system of a country, the opportunities and resources of a college may affect the learning process in that institution. Therefore, the generalizability of these findings to other groups (e.g., cultures, countries, colleges, students) is limited. Future studies on the current topic are therefore recommended.

Research and Publication Ethics Statement

Research approval was obtained from the ethics committee of Hacettepe University. The procedures used in this study adhere to the tenets of the Declaration of Helsinki. The participation to the study was completely voluntary. Informed consent was obtained from all participants included in the study.

Contribution Rates of Authors to the Article

The authors have equally contributed to the study.

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