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Full Length Research Paper

Cognizance of collective bargaining and its benefits in relation to teacher's welfare and working condition in public secondary schools in Delta State

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The study focus mainly on the cognizance of collective bargaining and its benefits in relation to teacher's welfare and working condition in public secondary school in Delta State, Nigeria. Two research questions were asked and answered in regard to the extent of awareness of Delta State public secondary school teachers of the principle of collective bargaining and the benefits of collective bargaining in public secondary school in Delta State. One hundred and twelve teachers were randomly selected from fourteen secondary schools in Delta Central Senatorial District in Delta State, Nigeria. The questionnaire which was rated on a five point Likert Scale was administered as the main instrument and the reliability coefficient was 0.90. Descriptive statistical procedures were employed in the analysis of data. The study revealed that the awareness of collective bargaining in public secondary school in Delta State was moderate as the respondents were not all members of the teachers' union. The resolution of issues relating to better working conditions, welfare, promotion, recognition and reward of staff were done through collective bargaining. Furthermore, some of the benefits revealed from findings of the study were better working condition, staff welfare, recognition and promotion. The study recommends that teachers should have better and clear understanding of collective bargaining; finding out their grievances and discussing various issues leading to addressing general school disputes and not just focusing on wage increment only.

Key words: Collective bargaining, welfare, working condition, union, education.

INTRODUCTION

Collective bargaining is viewed as the practice of negotiation and reaching shared consensus on request of employees regarding certain upgrades in the terms and conditions of employment (Okene, 2009). It is also viewed as the meeting of unions and management in negotiating and deliberating over employment terms and conditions (McKersie and Cutcher-Gershenfeld, 2009).

In education, collective bargaining is a process by which management and labor (school boards and educator) negotiate to reach an agreement on working conditions such as salaries, hours of work and benefits (Badoi, 2014).

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Negotiation entails official or unofficial discussion with the intention of reaching a consensus. It is therefore imperative that negotiations be done in good faith so as to have an effective collective bargaining. Here, good faith implies that parties involved in the bargaining are to be honest and helpful in their intention. Good faith is voluntary and persistent efforts of the two parties involved in bargaining and are not imposed by law (Yonlonfoun and Agbajeola, 2019). The success or failure of the bargaining process is dependent on the level of maturity and strength of the workers' and employers' organisations or their representatives (Awe and Obala, 2012).

In Nigeria according to Okolie (2010), provisions were made for collective bargaining in 1990 under the labor Act Cap. 198 Laws of the Federation. It ensures that both the employers and employees voices are equal in the negotiation process so as to have a fair and equitable bargain outcome (Olulu and Udeorah 2018). Though, according to Olulu and Udeorah (2018), the agreement scope is restricted by the provisions of the law. Therefore, shared agreement cannot be achieved by contract what the law disallows. To attain efficiency and fairness in the work place, there is need to protect interest of both employers and employees which can be attained only through collective bargaining. To conclude a collective agreement which bind the signatories of those concerns is the aim of collective bargaining.

In the secondary school setting, principals play very vital roles as head of the organizations. They plan, direct, organize and coordinate teaching, learning and other related activities in the school. They are in position to care for their staff, reduce as much as possible stress situations at work including issues related to salaries and remunerations. According to Yonlonfoun and Agbajeola (2019), principals belong to various union and they therefore stand in better positions to calm their teachers in times of conflict. Quality of life is part of employment relationship as explained by (Maslow, 2000), thus, employees self-actualization must be facilitated by management in order to satisfy important needs which breeds overall employees' satisfaction. Principals need to ensure that their relationship with teachers, Parent Teachers Association (PTA), parents, and the community are cordial. This is because strain in the management and employee relationship as a result of absence of empathy could lead to conflict in collective bargaining (Brown et al., 2014). In addition, Mushumbusi (2018) claimed that conflict, social exchange, and collective bargaining are integrally connected since collective bargaining is a social incidence.

The teachers in the school have the right to collective bargaining with employers in respect to issues concerning their interest and work in general. This is done through the teachers union known as National Union of Teachers (NUT) which is formed to ensure improvement in teacher's condition of service by ensuring that they are not oppressed and exploited (Cloutier et al., 2012; Adi and Sambe, 2018). The assurance that NUT will represent their interest regarding welfare and condition of service motivates and make them to be more committed to their job.

Disputes and crisis has been common occurrences in public schools. This is as a result of differences in opinion, leadership styles and ability of management to meet up with employees' demands, poor working condition and promotion of staff. These problems need to be properly handled and resolved and this is where collective bargaining comes in. Conflict is one of the numerous challenges in secondary schools which could be resolved amicably if principle of collective bargaining is applied. The success of any bargaining process is the arrival to a collective agreement.

Thus, this study is about finding out answers to these two research questions;

1. What is the extent of awareness of Delta State public secondary school teachers of the principle of collective bargaining?
2. What are the benefits of collective bargaining in public secondary school in Delta State?

LITERATURE REVIEW

The concept of collective bargaining

Sydney and Beatrice Webb, a founder of the field of industrial relations in Britain was the first to use the term Collective bargaining in 1891 (Rose, 2008 cited in Ugbomhe and Osagie, 2019). Webbs propounded the classical model of collective bargaining in their renowned book titled "industrial democracy", which was principally an economic model **(**Sidney and Webb, 1987 cited in Mushumbusi, 2018). According to Webb, collective bargaining was solely the method adopted by trade union without the employers having direct or indirect interest. It replaced collective opinion for personal bargaining. Webb sees the technique of group bargaining as replacement for personal bargaining where employers' role and the role of their association are ignored. The strategy of collective bargaining is that negotiations are between the employer and the workers so as to reach a compromise or agreement. The process of collective bargaining covers such issues as salaries, wages, increments, job ranking and categorization, work duration, annual leave, promotions and retirement. These issues are capable of resulting to industrial disputes if not properly negotiated.

Collective agreement is the result of the bargaining process. According to Ugbomhe and Osagie (2019) collective agreement "is enshrined in Article 2 of the Right to organize and Collective Bargaining Convention of 1948.In terms of the Act, collective agreement mean, any agreement in writing for the settlement of dispute relating

to terms of employment and physical conditions of work concluded between: (a) an employer a group of employers or organizations representing workers or the duly appointed representative of anybody or workers." Therefore, collective bargaining means the coming together of management and union representatives to negotiate on issues affecting them as regards the terms and condition of employment. Awe and Obala, (2012) asserted that Negotiation and Agreement are two key words that are noteworthy in the concept of collective bargaining.

Origin of collective bargaining

Collective bargaining inception in Nigeria cannot be separated from the formation of industrial unions. Industrial unions were part of industries in Nigerian when civil service union was formally formed by government workers in 1912. After the amalgamation of Northern and Southern Protectorates by Lord Lugard in 1914, it was changed to "Nigerian Union of Civil Servants" (NUCS). The Nigerian Railway Workers Union (NRWU) and the Nigerian Union of Teachers (NUT) (which comprised teachers in nonpublic schools) were later formed in 1931. In1938, unions were legalized which resulted to fast formation of union during World War II due to the Colonial Development and Welfare Act passed in 1940 by the British government (George OJ, Owoyemi O, Onokala U, 2012). By implication, there cannot be collective bargaining in an absence of an umbrella body or group with which employers and employees union can negotiate.

Trade or industrial union can be viewed as a group of employees that liaise with employers on issues that concern work condition of group members. Also, the industrial Unions Act Cap. 432, section 1(1) of The Law of Federal Republic of Nigeria 1990in the study of Ughulu and Nwokike (2020) defined trade union as "Any combination of worker or employer, whether temporary or permanent, the purpose of which is to regulate the terms and conditions of employment of workers, whether the combination in question would or would not, apart from this Act, be an unlawful combination by reason of any of its purposes being in restraint of trade, and whether its purposes do or do not include provision of benefits for its members."

Since independence, the employer-employees relationship in the workplace has been fostered through the enactment of various decrees, laws, acts and amendment. The most recent labour act is the 2005 Trade Unions Amendment Act. Its main objective is to provide and ensure union and labour democratization and liberalization as well as guaranteeing Nigerian workers the right and freedom to form and join any association (Ughulu and Nwokike, 2020).

The amendment of the Principal Act reveals collective bargaining pointing out the formation of Electoral College by all registered unions. The Electoral College will be responsible for the election of members who will serve as the union negotiating representatives with employers.

The benefits of collective bargaining

There are various benefits that may ensue from effective cognizance of freedom to collective bargaining. Teachers' voices are held in their place of work through collective bargaining (Wagaki, 2013). Bargaining helps in the assurance of fair pay and welfare packages, improves the recruitment and retention of teachers. Teachers also negotiate through collective bargaining better condition for teaching and learning. This means that every person connected to the school such as teachers, learners, professional supporters, taxpayers, administrators and parents benefit from collective bargaining.

The teaching and learning process in the school system can improve through the help of collective bargaining. The learning conditions of students are enhanced if the working conditions of teachers are well taken care of. This could be visible when issues relating to the school and the classroom are being addressed. Such issues may include putting limits on the size of the class, specifying the time for teachers and their assistants to effectively share classroom activities, issues of the health of school building and general safety in the school, and seeing to it that teachers invest and advance in personal professional development and learning (Wagaki, 2013; Yonlonfoun and Agbajeola, 2019; Egboro, 2019).

High quality educators can be attracted and retained through effective collective bargaining process (Yonlonfoun and Agbajeola, 2019). This can result to the level of compensation that will match or surpass other competing employers (Yonlonfoun and Agbajeola, 2019). The choice of education as a career or the decision to work as an educator in a specific institution is dependent on the incentive or pay package which is in form of the professional earned salaries.

According to Egboro (2019), research revealed that if teachers' salaries are increase by eleven percent weekly would upsurge the percent of students by twenty-six percent who willing to join the teaching profession. The strength of teachers increases in numbers when they come together as a union helping them to bargain for better pay package. Traditionally, teachers are being underpaid when compared to their counterpart in other professions. Bargaining as a body will help leverage their power as regard compensation and remunerations as well as improvement in their working conditions.

According to Egboro (2019), in his study on union influence on teachers' working condition and welfare stated that teachers work environment is disgusting as there are lack of facilities such as classrooms, teaching materials, laboratories, furniture, chairs, desks, libraries, books and hostels due to government failure to

Table 1. The extent of awareness of principle of collective bargaining in public secondary school.

Items on applicability of collective bargaining principles	Descriptive statistics			Remark
	N	Mean	Std. deviation	
I understand the term collective bargaining	100	4.25	0.903	+
My school follows the principle of collective bargaining process	100	3.62	1.135	+
I have witnessed dispute during collective bargaining	100	4.05	1.067	+
Control over conflict is one of the problems facing heads of schools	100	4.55	1.929	+
I am a member of the union team involved in collective bargaining	100	3.41	1.342	+
Issues are resolved by the school head through collective bargaining	100	3.74	1.160	+

+ (positive sign) = accepted.
Source: Field work, (2021).

make provision for them. Egboro (2019) further stated that the classes are overcrowded as there are limited classrooms to accommodate students. Corroborating, Ojeje and Adodo (2018) further stated that in some of these schools, some buildings are still in dilapidated state with falling walls, unfurnished classrooms, lack of water and electricity, without toilet and if any, very disgusting, and unequipped offices. Teachers are required to function in this unfavorable and ill-motivated environment and are still expected to deliver good outcome (Egboro, 2019). These are some of the reasons the Nigerian Union of Teachers (NUT) overtime are concerned over the improvement in teachers' welfare and service conditions.

RESEARCH METHODS

This is survey research which drew its sample from the entire population of 490 teachers' in 179 public secondary schools in all the 8 local government areas in Delta Central senatorial districts of Delta State, Nigeria. The stratified random sampling was used to group the schools into urban and rural, and the teachers into male and female. The simple random sampling technique was then used to select 14 (7 urban and 7 rural) public secondary schools and a total of 112 teachers (comprising of 5 female and 3 male from each of the schools) which was 23% of the total population were sampled for the study. The instrument for data collection was a structured questionnaire titled 'Cognizance of Collective Bargaining and its benefits in relation to Teacher's Welfare and Working Condition in Questionnaire (CCBBTWWCQ).' The questions were graded on a 5-point Likert scale: 5 Strongly Agree, 4 Agree, 3Undecided, 2 Disagree, and 1 Strongly Disagree. The questionnaire was checked by a senior lecturer in educational administration for clarity of content and to ensure that the items measures what they were supposed to measure. Pearson Product Moment Correlation was used to compute the reliability after administration to 20 teachers in secondary schools not included in the study. The reliability coefficient arrived at was 0.90. The researcher with two assistants administered the questionnaire personally to all the one hundred and twelve (112) respondents in all the 14 sampled schools in Delta Central. The total of 100 questionnaires was successfully retrieved after completion by the respondents.

Descriptive statistics showing mean scores and standard deviation were used to evaluate the research questions. The bench mark for accepting an item for the mean score is 3.00. Therefore any item with mean score from 3.00 and above was accepted while any item with mean score below 3.00 was not accepted.

RESULTS

Research question 1: What is the extent of awareness of Delta State public secondary school teachers of the principle of collective bargaining? The descriptive statistics to answer research question 1 is shown in Table 1.

The data as displayed in Table 2 indicated that half of the teachers agreed that they are aware of the principle of collective bargaining while the others disagreed as can be seen from the mean and standard deviation scores.

Research question 2: What are the benefits of collective bargaining in public secondary school in Delta State? The descriptive statistics to answer research question 2 is displayed in Table 2.

DISCUSSION

The findings of the study have shown that some of staff in the public secondary school in Delta State has no clear understanding of collective bargaining. They affirmed that their schools seldom follow the principle of collective bargaining. This finding corroborates that of Olulu and Udeorah (2018) who asserted that the idea of collective bargaining has been accepted and recognized internationally both in the public and private sector. In addition, the finding on conflict during collective bargaining agreed with Egboro, (2019) who opined that in bargaining methods and strategy, the interest of labour and management are often in conflict. Furthermore, the finding has the support of Mushumbusi (2018) claimed that Conflict, social exchange, and collective bargaining are integrally connected since collective bargaining is a social incidence. Adding that, in collective bargaining, two parties with contrary opinion and objectives come together to deliberate on matters of interests and needs. Supporting this Brown et al (2014) explained that strain in the management and employee relationship as a result of absence of empathy could lead to conflict in collective bargaining. The finding also agrees with Yonlonfoun and Agbajeola (2019) who reported that Principals are part of union bargaining team such as the Nigeria Labour

Table 2. The result of the benefit of collective bargaining in public secondary school.

Principle of collective bargaining approach	Descriptive statistics			Remark
	N	Mean	Std. deviation	
Union in my school strives for better working conditions	100	4.29	5.271	+
The welfare of staff is priority in my school	100	3.27	1.278	+
My school strives for equality in teachers' promotion schemes	100	3.43	1.305	+
My school recognizes my professional inputs and gives reward	100	3.22	1.374	+
My school always requests my contribution in education reform matters that affects me	100	3.14	1.356	+
Collective bargaining strategy improves my motivation and commitment	100	4.44	5.211	+

+ (positive sign) = accepted
Source: Field work (2021).

Congress (NLC), Nigerian Union of Teachers' Registration Council (TRC), Science Teachers Association of Nigeria (STAN) and they also belong to a body committee of principals known as the All Nigeria Conference of Principals of Secondary Schools (ANCOPSS). They stand in better positions to calm their teachers in times of conflict. Several studies have shown collective bargaining as the best strategy of resolving conflict in the workplace (Chidi, 2010; Cloutier et al., 2012; Ojo and Abolade, 2014; Adi and Sambe, 2018). The finding on the role of the school head in resolving issues is supported by Yonlonfoun and Agbajeola (2019) who posits that principal interaction with their staff can pave ways for effective bargaining.

The benefits identified in the study includes; better working conditions, staff welfare, staff promotion, improvement in teachers motivation and commitment and recognition and reward. The finding is in concordance with Egboro (2019) who asserted that the improvement of teachers' working condition over times has been NUT concern. In Support of the finding, Wagaki (2013) is of the view that those teachers' trade unions through collective bargaining fights for the teachers' benefits and also involve them in the formulation of policies regarding education reforms. He stressed that increase in the salaries of teacher, allowances and promotion opportunities generally motivates teachers. When teachers perceive principals' bargaining strategy to be appropriate they grow in commitment, professional involvement, and willingness to strategize.

Conclusion

Collective bargaining is a known concept in Delta State public secondary school. The awareness of collective bargaining has accrued lots of benefits to teachers in public secondary school in Delta State Nigeria. This study highlighted the relevance of collective bargaining which various school inspectors, supervisors, counselors and parents can utilize to ameliorate the current problem of coordination which teachers and principals face in the course of performing their duties. It will enable stakeholders in education (principals, teachers, parents, communities and students) fashion out strategies to improve bargaining in secondary schools.

Recommendation

The study recommends that teachers should have better and clear understanding of collective bargaining; finding out their grievances and discussing various issues leading to addressing general school disputes and not just focusing on wage increment only.

Limitation and suggestion for further study

The vastness and the limited available time for the work make it difficult to access majority of the schools. This forced the researcher to limit the research to few schools Delta Central State. Also, the instrument used for the study would have included principals' questions also to enable the researcher have a clear understanding of the view of principal and teacher regarding the problem under investigation.

Similar studies on a broader scale that will cover a greater number of states in Nigeria should be conducted. This is to offer an idea of what has been obtained in other states.

Contribution to knowledge

The findings from this study is an addition to shared knowledge as it reveals that not all teachers in secondary schools in Delta Central have clear understanding of collective bargaining and that there was less improvement in the welfare and working conditions of teachers.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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An analysis of student decision making for educational recommender systems

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Recommender systems in education aim to help students make good decisions about the direction of their learning. The design of such systems in conventional research has treated the decision making process of students as a black box and assumes the best recommendations to be those that accurately predict student choices. Such an approach overlooks potentially valuable use cases for supporting optimal decision making, especially in self-directed learning contexts which present such challenges as identifying all available options, accurately evaluating the options against selection criteria, and selecting the best choice. This qualitative study aims to understand the areas where students struggle in the context of planning an open-ended project in order to inform the design of educational recommender systems. Data from interviews with 7 students at an international engineering school in Japan are analyzed to examine choice behaviors, influences on choice, and difficulty to choose in a self-directed learning context. The results illustrate considerations for designing educational recommender systems that can support the divergent thinking and convergent thinking demands of decision making. We provide case-based examples where the use of different recommender metrics, such as novelty and diversity, may provide value to users with different approaches to the decision-making process.

Key words: Decision making, self-regulated learning, educational recommender systems.

INTRODUCTION

In self-directed learning (SDL), learners are empowered to make their own decisions about their learning goals, assessment criteria, and resources while practicing self-regulation to achieve their goals (Robinson and Persky, 2020).

While SDL is often discussed in broad contexts that include non-traditional classroom settings, self-regulated learning (SRL) is studied in academic circles as the complex process in which students monitor and control their thoughts, feelings, and actions in pursuit of their learning goals. Throughout the process, students regularly consider multiple courses of action and must rely on their decision-making skills from planning to completion. Although there are several theoretical perspectives

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emphasizing different factors of the SRL process, it is generally assumed that students are aware of how their own self-regulatory processes affect their academic performance (Zimmerman, 2001). One might think that such awareness would lead students to act in their own self-interest and maximize their performance; however, they are regularly observed to make suboptimal decisions about what and how to study (Covington, 1992). Reasons for this may stem from their core values, beliefs about available options and decision-making strategies, or other factors influencing their performance (Byrnes et al., 1999). The task demands associated with self-regulation in open-ended learning contexts may also contribute to reducing learners' effective decision making (Baumeister et al., 1998). Thus, the ability to make well-informed and valuable decisions in open-ended, self-directed learning contexts is an essential but difficult skill to master.

In technology-enhanced learning (TEL), various decision-support systems have emerged from advances in big data and artificial intelligence. In particular, educational recommender systems (ERS) have emerged from the combination of digital learning environments that collect data on learner behavior with techniques for understanding and applying this data from learning analytics (Greller and Drachsler, 2012). Researchers studying the use of ERS in educational contexts are largely aware of the unique challenges they face compared to their commercial counterparts, and have made a number of useful observations to date. Some of the stated goals of ERS are to effectively and efficiently support the learning process, and thus their evaluation should measure such capabilities with user-centered studies (Manouselis et al., 2012). However, much of the ERS research continues to follow industry practices by focusing on algorithmic prediction accuracy and user satisfaction (Erdt et al., 2015). Relatively few recent studies evaluate domain-specific aspects of task support, learner motivation, and learning performance, or measure user perceptions of recommendation qualities such as usefulness, novelty, and diversity (Marante et al., 2020; Deschênes, 2020). This suggests that, rather than focusing on the learner's experience of interacting with the system, researchers continue to emphasize the system's ability to predict what the learner will choose. Treating decision making as a black box of inputs and outputs misses valuable opportunities to understand key behaviors that recommender systems aim to improve (Chen et al., 2013).

In response to this need for researchers to understand student decision making as they interact with the next generation of decision support technologies, we present this qualitative study as an attempt to better understand student decision making in self-directed, open-ended learning contexts. Specifically, we seek to identify students' decision-making behaviors in the planning phase of a self-directed learning project by examining (1) the extent to which they explore their options before selecting a learning goal, (2) the criteria they use when planning an open-ended, time-limited project, and (3) the areas where they struggle when selecting from their available options. The remaining sections are organized as follows. In the Literature Review section, we review relevant models and research on self-regulated learning, decision making, and ERS. The Methods section describes the approach of this qualitative study. In the Results and Analysis section, we relate our observations to our research questions and existing models, before summarizing our findings and their relevance to the design of an ERS in the Discussion and Conclusions section.

LITERATURE REVIEW

Self-regulated learning research has produced several models depicting the SRL process as cyclical, involving cognitive, motivational, and affective operations in three general phases (Panadero, 2017). These phases are: (1) the planning phase, which involves processes such as task interpretation, analysis, and goal setting; (2) the performance phase, in which learners enact and monitor their chosen strategies; and (3) the evaluation phase, which is characterized by feedback, reflection, and adaptation. One such model introduced by Winne and Hadwin (1998) specifically emphasizes the involved conditions, operations, products, standards, and evaluations called the COPES model. It identifies the information processing operations of searching, monitoring, assembling, rehearsing, and translating (collectively referred to as SMART) which are performed across the four stages of understanding, planning, performing, and evaluating.

SRL models assume decision making and goal setting to happen implicitly across the various phases rather than attempting to describe specific mechanisms for them. The COPES model is unique in that it includes the SMART operations as specific sub processes that may be used in the decision-making process itself. Winne (2001) further identifies AEIOU influences on learner choice as attributions, efficacy judgments, incentives, outcome expectations, and utility. Cases in which students intentionally choose suboptimal courses of action are then described as the results of weighing efficacy judgments and outcome expectations against utility and incentives.

Decision making

Decision-making involves making tradeoffs that are constrained by the limits of human cognition and influenced by personal and environmental characteristics. Personal characteristics include past experiences (Juliusson et al., 2005), biases (Kahneman et al., 1982), and emotions (Damasio, 1994). Environmental influences include perceived feasibility, expected outcomes, and

social consequences (Grant, 2011). The limitations of human cognition require that effort be expended to identify and evaluate alternatives until the decision maker stops searching and makes a decision (Zopounidis, 2011). When faced with increasing search effort, decision makers may lower their standards for choice selection to reduce cost effort, even when aware that further search effort may lead to the discovery of better options (Payne et al., 1993). The term "satisfice" was coined by Simon (1957) to describe this act of choosing an option that may not be objectively the best, but is sufficient and satisfying to the decision maker. The extent to which they are willing to search for a good option can be determined by heuristics, which serve as computational models for choosing an option under certain circumstances (Gigerenzer et al., 2011). While heuristics may be useful for optimizing the use of limited cognitive resources, the ability of individuals to adhere to them is prone to error (Bhatia et al., 2021). In contrast to satisficing, maximizing involves considering all possible options before making a choice (Schwartz et al., 2002).

The decision maker's ability to maximize choice is strongly influenced by the conditions of the choice situation. In the rational model of decision making, the ideal choice situation is one in which the decision maker is fully aware of the desired outcome, has identified clear selection criteria, can evaluate each alternative to determine the optimal choice, and has the ability to implement the decision (Schoenfeld, 2011). Open-ended problems in self-directed learning rarely meet all conditions for being considered ideal decision situations. Here, the concept of bounded rationality may be more appropriate, as it recognizes that the decision maker must explore all options, has a limited ability to predict the outcomes of each choice, and selects options that are satisfactory within the given constraints (Simon, 1997).

Objectively rational decision making becomes largely impractical when the problem space is not well defined and an exhaustive list of options cannot be provided.

The tasks of searching for and selecting alternatives are accomplished by using divergent and convergent thinking (Runco, 2014; Lee, 2017). Divergent thinking is the cognitive process of generating or identifying multiple possible solutions to a question, while convergent thinking is the process of evaluating each solution and eliminating those that have no value with respect to the goals of the problem (Kim and Pierce, 2013). The SMART operations from the COPES model of self-regulated learning are similar to the concepts of divergent and convergent thinking. That is, the operations of searching and translating can be used to discover or create new information, while the operation of assembling creates new relationships between existing information. Once information is known, the rehearsing operation holds it in mind while the monitoring operation evaluates its qualities. Research shows that the practice of divergent and convergent thinking has several potential benefits for SRL, such as fostering tolerance for ambiguity and encouraging experimentation (Coleman et al., 2020). As the ability to generate numerous, novel, and diverse ideas, divergent thinking is considered a facet of creativity (Treffinger et al., 2002) and has been associated with rational decision-making styles (Palmiero et al., 2020). Contextually, the freedom to explore possibilities has been linked to student motivation and self-regulating efficacy (Flum and Kaplan, 2006). Using divergent thinking and convergent thinking together is generally recognized as a best practice for generating creative solutions to open-ended questions (Lee, 2017). Without divergent thinking skills, students may become fixated on a limited set of options, focusing their attention on a narrow set of ideas rather than generating fresh concepts (Butler and Roberto, 2018).

Once all available options are identified, the precise mechanism by which a person chooses is described in the emotion-imbued choice (EIC) model, which integrates existing models and theories of rational choice with 35 years of research into the influence of emotion in judgment and choice (Lerner et al., 2015). The EIC model combines evaluations of expected choice outcomes, choice qualities, and individual qualities with emotions integral to the decision, incidental emotions, and anticipated emotions from choice outcomes. Inputs to the decision include the potential utility of an option, qualities of the option such as probability of success, and personal qualities such as risk aversion, while their weights are influenced by various emotions related to the characteristics of the decision maker, the anticipation of certain outcomes, and the difficulty of the decision effort itself.

Decision support technology

Given the natural complexity of human decision making, several incarnations of technology have emerged to simplify the process. Jameson et al. (2014) propose the ASPECT model for researching and designing decision support technologies in the field of human-computer interaction (HCI). The model describes six patterns of decision behavior that system designers should consider when planning decision-enhancing features. The six patterns are aspect-based choice, socially-based choice, policy-based choice, experience-based choice, consequence-based choice, and trial-and-error-based choice. Following these patterns, a second model, called the ARCADE model, summarizes strategic approaches for technologies to implement when supporting user choice. These strategies include: accessing information and experience; representing the choice situation; combining and computing; advising on processing; designing the domain; and evaluating on behalf of the user.

As a form of decision support technology, educational recommender systems provide learners with information in their search for alternatives and evaluate options on their

behalf. The most common goal of educational recommender systems is to help learners find learning resources, such as content, activities, or sequences of items (Drachsler et al., 2015). Recent research on these methods and their usefulness to learners is sparse, as shown in a review of ERS that support learner agency (Deschênes, 2020). The majority of the studies reviewed report some form of prediction accuracy metric (e.g., precision and recall) to evaluate the recommendations they provide, while those that report user-centered measures tend to focus only on user satisfaction without exploring deeper qualities. In contrast to this trend, Fazeli et al. (2018) show that the user-centric attributes of usefulness, novelty, diversity, and serendipity are valuable for understanding the user side of the interaction.

Other systematic reviews covering a broader range of ERS research have looked for gaps in the areas of application and methods of recommendation, with the aim of providing directions for future research (Urdaneta-Ponte et al., 2021; da Silva et al., 2022). Their findings show that few studies investigate the hybrid use of intelligent techniques that combine information about the user; there is little evidence of pedagogical effectiveness; and no studies investigate known issues for recommender systems in general, such as those related to the presentation of recommendations. Besides the complexity of human decisions, learning processes are also shaped by learners' educational interests (Verbert et al., 2012) and individual characteristics (Buder and Schwind, 2012). For these reasons, understanding all the factors involved is essential to overcoming the challenges of designing an effective and trustworthy ERS.

METHODS

This qualitative study analyzes data from interviews with students aged 16-17 regarding their experiences in an individual self-directed learning project. The project took place over five weeks at a small engineering school in Japan called the International College of Technology, Kanazawa[1]. Students enter the school around the age of 15 and join an intensive educational program that combines general post-secondary education with specialized engineering topics over five years. The SDL project is positioned at the end of a series of computing courses that introduce students to a variety of computing topics such as animation, video editing, programming, and web design. After two years of these computing courses, students begin the project where they must choose new skills to learn, plan their activities, and practice self-regulation in a completely autonomous project. The project requires them to make several planning decisions, including their topic, tasks, and final goals; the software and technologies they will use; and the rubric items on which they will be assessed. The teacher's role, in addition to a final assessment based on the rubric items chosen by the students, is limited to providing guidance and approval of the topics chosen by the students. How students approached these decisions for planning their self-directed learning was the focus of the interviews.

The authors first observed a class of 12 students during two of the five class periods designated for the project— one period at the beginning of the project and one at the end. The first class period was devoted to a brief introduction of the project, followed by time for students to plan their learning goals and specific tasks. At the time, it was explained to the students that they needed to choose a new computer skill to learn and the tasks they will complete in order to learn it.

They were instructed to write 3-5 tasks and allocate to them points for the final project grade. Up to 75 points were free for the students to distribute while the remaining 25 were reserved for the teacher's assessment of difficulty. Students then shared their chosen approach and the results of their efforts in presentations during the final class period.

After the semester finished, we asked to conduct interviews at a time when all grades had been completed but not yet reported to the students. Of the 12 students in the class, 8 were selected for interviews based on their ability to communicate clearly and reflect on their process as observed in the final presentations. All but one of them agreed to participate in the study. The interviews were conducted in four separate sessions, each consisting of one interviewer with one or two participants. The sessions were 30 to 40 min in length and were audio-recorded for later transcription. The audio recordings were transcribed using pseudonyms to protect participant confidentiality following the interviews.

During the interviews, participants were asked to reflect on the reasons for their choices as well as perceptions of their final outcomes. Guiding questions for the semi structured interview format focused on various dispositional, situational, and contextual factors surrounding each participant's project decisions. These questions were developed according to Kaplan and Flum's (2010) shared perspective of achievement goal theory and identity formation style theory; however, a previous analysis of the interview data from the same theoretical perspective yielded few interesting results (Songer and Yamamoto, 2021 for this analysis of the interview questions and results).The present study adopts an alternative analytical approach that focuses on decision-making influences and behaviors. The new analysis reexamines the interview data for (1) influences on student choices based on models for SRL and emotion-imbued choice, (2) choice behaviors based on the ASPECT model, and (3) difficulties to choose in terms of divergent thinking skills, convergent thinking skills, and aspects of decision making in self-regulated learning.

RESULTS AND ANALYSIS

Data on individual project outcomes, including overall theme and specific tasks selected by the participants for assessment as rubric items, are presented in Table 1 with each participant identified by their assigned pseudonym. What follows is an analysis summarizing for each participant the influential factors and decision-making behaviors involved in their decision, the extent to which they explored their options in their search, their criteria for selection, and difficulties encountered in the process.

Kenta decided to build an entire model of a car from the ground up using Fusion 360 (Autodesk) and print it out on a 3D printer. His choice was influenced by a desire to avoid tasks that were either too difficult or so easy that they would, as he put it, make him feel lazy. He expected the car model to be an enjoyable task that would improve his skills with the software. Kenta was confident in his experience with Fusion 360 from previous classes and felt it would be easier than his perceived alternatives of desktop publishing ideas.

Kenta described his perceived choice as between 3D

[1]https://www.ict-kanazawa.ac.jp/

Table 1. Planning decision outcomes of each participating student.

Participant	Project theme	Specific tasks
Kenta	Car Model in Fusion 360	Create moveable parts and 3D print
Takeo	Name Logo in Photoshop	Use two filters, an AI feature, and layer masks
Aya	Music Video in Premiere and Animate	Add a lip syncing animation and produce video of a certain length
Kei	Reinforced Learning in Python	Complete textbook problems and create an original program
Kazu	Video in Premiere with After Effects	Create an After Effects file
Shin	Appearance Attributes in Illustrator	Use features in the appearance panel to create various effects
Sakura	Image Editing in Photoshop	Add or change effects on an image

Source: Author.

modeling in Fusion 360 or desktop publishing in Photoshop (Adobe) and Illustrator (Adobe). His interest and experience led him to choose the car model and create every part himself, including moving parts such as doors or wheels. In the end, he had difficulty estimating the amount of time and effort it would take, as well as assessing his own ability to complete the work. He was unable to print the model by the end of the project.

Takeo created a logo of his name in Photoshop using filters, layer masks, and an AI function. He cited a lack of interest in programming and 3D modeling as a reason for choosing Photoshop, a tool he was comfortable with. The freedom of choice allowed him to choose a software tool he found easy to use and to avoid what he called "teacher slave labor". Kenta and Takeo both exhibited primarily attribute- and experience-based decision making, influenced by an anticipated enjoyment associated with their choices.

Takeo did not report exploring options or considering alternatives before choosing Photoshop. As a result, he may have chosen a skill that has no expected benefit to his future goals due to his limited perspective of available options. He stated that he would like to apply his skills to business and innovation in the agricultural industry, but it was not clear how this project would contribute to that goal. However, this contradiction did not seem to affect Takeo much, as he was able to make a decision on the first day.

Aya decided to create a music video in Premiere Pro (Adobe) with the addition of a lip-syncing animated character created in Animate (Adobe). She described feeling like the project had to be something big or complicated, such as programming; however, she chose to follow her interests in multimedia as she claimed to lack the confidence for programming. She also reported feeling pressure from perceived social expectations about the difficulty of the project, as well as time pressure from the demands of other classes. As a result, Aya had numerous criteria for selecting a project idea: (1) the tool had to be one that she felt confident with; (2) the tasks had to be advanced enough to earn points for difficulty; (3) the idea had to be unique so that she would stand out from her peers and get a good grade; and (4) the tasks had to be easy enough to complete during class time. She consulted with a classmate and together they considered many other options, such as video editing, 3D, desktop publishing, and programming. However, they struggled to choose the one with the best balance of grading potential and time efficiency. In the end, Aya spent two of the five class periods considering her options before finally settling on a topic. She was unique among the participants in that she exhibited decision-making behavior based primarily on consequences of choice, social expectations, and personal policies.

Kei immediately saw the project as an opportunity to learn about the machine learning topic of reinforcement learning from a textbook he had previously purchased for club activities but never used. He was concerned only with the teacher's approval, not with his classmates' perceptions or their ability to understand his topic. His decision was based solely on his own personal interest in the subject matter of the book.

Kei just explored the programming problems in the textbook and chose the ones he liked. The teacher gave him additional criteria for creating an original program so that he would have to apply the concepts rather than just copying solutions from the book. Overall, Kei had no difficulty choosing the topic, but he experienced a challenge in designing the original programming task.

Kazu decided to create a video using Premiere Pro and After Effects (Adobe), although it was not his first choice. He reported an initial interest in 2D animation using Live2D (Live2D Ltd.), but his idea was rejected by the teacher on the grounds that it would be a repetition of another project he had already done. He wanted to avoid subjects he considered boring, such as programming and web design. Unfortunately, his desktop PC broke down early in the project and he was forced to do it on a tablet PC instead. His final choice was influenced by the qualities of technical feasibility, anticipated enjoyment, and the desire to learn After Effects.

Kazu's exploration of alternatives was limited to programming, web design, 2D animation, and video editing. He eliminated options that he did not find fun and new, while the teacher eliminated the 2D animation option for him. Kazu also had technical criteria that the tasks be feasible on his tablet PC's weaker hardware. After his

Table 2. Summary of factors influencing participant choices, their exhibited decision-making behaviors, and experienced difficulties (DT = Divergent Thinking; CT = Convergent Thinking).

Participant	Influences on choice	Choice behavior	Difficulties
Kenta	Anticipated emotions	Attribute-based Experience-based	DT; Time estimates; Efficacy judgments
Takeo	Personal experience Anticipated emotions	Experience-based	DT; Maximizing utility
Aya	Time pressure Social perceptions Current emotions	Consequence-based Socially-based Policy-based	CT; Maximizing cost (time) vs. benefit (scoring)
Kei	Expected utility Current emotions	Experience-based Socially-based	DT & CT for designing an original solution
Kazu	Technical restrictions Anticipated emotions Expected utility	Attribute-based	DT; Maximizing utility
Shin	Personal experience Current emotions Expected utility	Experience-based	CT; Evaluating rubric items
Sakura	Current emotions Social perceptions	Attribute-based Socially-based	DT; Evaluating rubric items; fixation

Source: Author.

original idea was rejected, he could only think of doing a video editing project instead. This proved to be slow and cumbersome on his tablet.

Shin chose to focus his project on Illustrator's appearance attribute settings, which he claimed to have an existing interest in before the project began. He had knowledge and experience with Illustrator and saw the project as an opportunity to learn the features he had not previously used. He reported being aware that his peers probably thought he would choose a programming topic, but claimed that this expectation did not affect his decision.

While planning his project goals, Shin explored various effects that could be achieved with appearance attributes and selected specific ones to learn. He initially wrote rubric items to match specific attributes, but soon discovered while performing tasks that he needed to use them all to achieve each effect. This lack of familiarity with the features, which led to inaccurate rubric items, was his only reported difficulty.

Sakura decided to edit an image for various effects in Photoshop. She said she was interested in the software and wanted to learn how to use it the way others did. She admitted that she was unfamiliar with many of the features and was just following her impressions of what other people were doing with them. Her choice was influenced by the anticipated enjoyment of using Photoshop as well as social perceptions of its usefulness.

Sakura admitted that she did not explore other topics such as programming because she thought they were boring. Instead, she searched online for Photoshop tutorials that could be completed within class time and wrote her rubric items according to the various effects covered in the tutorial. She ended up fixating on a preconceived notion of how to use Photoshop and struggled to judge each effect's appropriateness as a rubric item. Her choice was one she could enjoy, though she was unsure the skills acquired would help her future career in management or data science.

Overall, participants reported a variety of influences on their decisions, choice behaviors, and difficulties during the decision-making process, as summarized in Table 2. Attribute-based and experience-based choice behaviors were the most prominent, as many of the participants reported choosing their topic out of anticipated enjoyment based on previous experiences with the software. In addition, choice-related emotions such as confidence and interest played a role in many of their decisions.

Kenta, Takeo, Kazu, and Sakura each reported considering only a few options, indicating a perceived lack of variety in the options available. As a result, Kenta chose a time-consuming goal, while Kazu's choice struggled with technical limitations. Takeo and Sakura's projects could be considered missed opportunities, as their respective outcomes had little apparent relevance to their future goals. These four participants would likely have benefited from divergent thinking support in the form of brainstorming or prepared lists of different topics.

Aya's case is a good example of a student who needs help with the convergent thinking side of the decision-making process. She had numerous criteria for choosing project tasks and spent a lot of effort trying to find the best choice. Her ability to maximize her selection was

ultimately successful, but took considerable time (a resource she had hoped to preserve) and required assistance from others. In this case of planning a self-directed learning project, participants' difficulties with divergent thinking skills outweighed those with convergent thinking skills.

DISCUSSION

This analysis integrates several existing models and theories to illustrate the multifaceted decision-making process in self-regulated learning contexts. SRL models attempt to link various factors from the learner and the learning environment with the cognitive, motivational, and emotional processes involved in self-regulation. While these models largely represent the SRL process as a feedback loop in which the results of students' performance and self-reflection are used to refine their strategies, they lack details about the acts of goal selection and decision making. The decision-making mechanism itself is addressed with models of rational, emotion-imbued choice and incorporates the sub processes of searching for available options, determining selection criteria, and evaluating alternatives to select the best one. Factors influencing the decision include expected outcomes, qualities of the choices and the decision maker, concurrent emotions felt at the time of the decision, and emotions experienced or anticipated while considering options and outcomes. When the psychological effort to process each option and maximize choice is too high, the decision maker will use satisficing criteria to make a decision before considering all options.

Educational recommender systems have the potential to support decision making in several ways as described in the ARCADE model (Jameson et al., 2014). For learners who struggle with using divergent thinking to discover new options, an ERS can provide information and present the choice situation to reveal options or aspects of the context that are beyond their perspective. Takeo, Kazu, and Sakura each had difficulty perceiving a wide range of options for their project topics, making them good target users for such a use case. In Takeo's case, recommendations for a wide range of topics would have increased his chances of finding something that met his criteria and also related to skills he would need in the future. Kazu would have benefited from novel recommendations to encourage more diverse thinking about fun project ideas that would work within the constraints of his computer hardware. Similarly, Sakura, who lacked confidence in her own decision-making ability, might have been more satisfied with her choices if they had been presented by an ERS she could trust. Such a system could process only some of the steps, leaving the rest to the user, or explain how the recommendations were generated to provide transparency and help engage the user in choosing (Jameson et al., 2015).

An ERS that aims to support discovery would need to compute metrics such as novelty and diversity to include items that the user has not previously considered. Novelty metrics could be global metrics calculated from the inverse of item popularity across all users or item unexpectedness relative to the user's previous experience (Castells et al., 2015). Aya, who believed that her grade depended on choosing a unique topic, would likely have benefited from recommendations generated using the global metric of inverse item popularity. On the other hand, users such as Kei and Kazu might have preferred user-specific unexpectedness, which is calculated by comparing an item's properties to those previously selected by the user. Such novel recommendations may have provided Kei with unique ideas for his original reinforcement learning problem. Similarly, Kazu might have discovered novel project ideas that he could enjoy without requiring a high-spec PC.

When users have specific selection criteria, the recommender system can incorporate them into knowledge-based and intelligent recommendation generation methods. Using these criteria, the ERS can evaluate items on behalf of the user and support convergent thinking by narrowing down a large subset of options. It could then present either a single optimized choice or a set of choices for consideration along with their relevant properties. These systems would use utility metrics that measure some benefit to the user as defined by their criteria. For example, in Aya's case, difficulty and effort rankings would allow her to quickly determine which topics might be the most efficient to achieve the highest score.

Even when the ERS evaluates options and presents a carefully tailored set to the user, the user may still struggle with the given size and diversity of the consideration set, depending on their tendency to maximize or satisfice their choice (Schwartz et al., 2002; Saltsman et al., 2021). The design of the ERS should consider adjusting the level of diversity in the option set (Willemsen et al., 2011) or presenting options that are clearly divided into categories and possibly marked for personalization (Mogilner et al., 2008). Since Aya spent two full class periods considering her options, it is clear that she was trying to maximize her decision. A consideration set for her would need to be organized with a variety of topics with high difficulty and low effort ratings.

As a qualitative study based on observations and interviews, these findings are limited by the nature of self-reported data. Participants may have been selective in how they answered the interview questions without being completely honest. Each participant had experience with the interviewer as a teacher prior to participating in the study, so their responses may have been influenced by this pre-existing relationship. In addition, self-report data are limited by the perspectives of the participants, who are likely unaware of the theoretical motivations behind each question. The effects of these limitations most likely

reduced the potential degree of data coverage and, to a lesser extent, accuracy.

Nevertheless, the purposes of this study do not dictate that broad coverage or strict accuracy be achieved, and it was believed that the data we were able to collect sufficiently illustrate the panorama of emotions, motivations, and cognitive processes involved.

The evaluation of ERSs in support of student agency has been heavily weighted towards prediction accuracy and away from user perceptions of recommendations (Deschênes, 2020). This analysis highlights specific aspects of decision making that contribute to the value students place on their choices, while the discussion relates these aspects to the design of recommender systems in education. By approaching interviews with students from the perspectives of SRL models, divergent thinking, convergent thinking, and emotion-imbued choice, we uncovered several examples of participants' decision-making behaviors, their search processes, the types of criteria they use for selection, and areas where they may struggle along the way. This discussion used these examples to highlight aspects of ERS design that have been largely overlooked in previous research. The cognitive demands of divergent and convergent thinking in the decision-making process are shown to be worthy issues for ERSs to address. Future research should explore approaches to the quantity, variety, and presentation of recommendations in terms of how they relate to the different decision-making qualities and characteristics of the learner. Educational recommender systems are positioned to provide unique value to learners, so it is important that researchers chart their own course rather than follow the trends of consumer-based systems.

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CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Review

A conceptual research of college students' boredom, learning attitude, academic achievement, and behavior

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Boredom is a topic worth studying, especially the impact of boredom on college students' study is worthy of further study. This research explained the related concepts of boredom firstly. According to the research content of previous researchers, boredom was divided into external influences and internal influences. The researcher also combined the 4 variables of boredom and college students' learning attitude, academic achievement and college students' behavior to explore their relationship. The researcher hope that this kind of relationship can provide advice to educators that will affect college students from different aspects and help college students improve their academic achievement.

Key words: Boredom, learning attitude, academic achievement, behavior, college students.

INTRODUCTION

Boredom is a negative emotion experience that human beings produce in their daily lives because of lack of activity and loss of interest, which have been identity by Zhou et al. (2012). In addition, the modern environment is characterized by repetition and repression. In this environment, people will experience the feeling of boredom more frequently (Britton and Shipley, 2010; Carroll et al., 2010). Tze (2011) find out that 40% of students are bored in class according to a self-reported questionnaire. Eastwood et al. (2007) reported that 51% of teenagers are very easy to be bored. These researches indicate that boredom becomes a common phenomenon among college students.

Besides, boredom could lead to some negative effects and psychological problems. Boredom is considered a subjective experience which consists of cognition and feeling aspects (Hill and Perkins, 1985). Boredom is also mentioned in flow model by Csikszentmihalyi (1997), it is experienced when perceived challenges are below actor's average of challenge and skills are approaching the average skill.

From multiple perspectives, such as emotion, pathology, cognition, and meaning, the effects of boredom have been studied. Most of the reason why students drop out from school comes from negative emotions – boredom, especially for middle school students (Wegner et al., 2008). Belton and Priyadharshini (2007) define that boredom is associated to antisocial behavior and 'school failure' (588), and even stimulate individuals to generate new thinking or action. Boredom can practically stand for danger causes, especially in young students (Britton and Shipley, 2010). The result of their research shows that

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people reflecting boredom has more suicidal thoughts. From the perspective of cognition, the researchers think that boredom is associated with individual cognitive failure and lack of attention. Therefore, boredom has become an important factor affecting the mental health of college students. Only by correctly understanding the boredom can an effective strategy be developed to help modern people solve various physical and psychological problems caused by boredom.

In this context, this paper presents a literature review on boredom and related concepts. In addition, the researcher put forward his own ideas about boredom affecting students' academic achievement: educators can change students' boredom state by affecting students' learning attitudes (from internal and external factors), and finally affect students' academic achievement.

BOREDOM

The concept of boredom

Ordinary, people know boredom in the role of a negative emotion, which composed of irritating, tedious, slow response, and listless. Mikulas and Vodanovich (1993) attribute boredom to a shortage inspire from the external environment and the individual's sentiment of despondency. Researchers in different fields have defined different aspects of boredom.

Boredom syndrome

The word syndrome was originally a medical term produced by Maslow (1954) based on the overall dynamics of the term, which refers to a complex of multiple symptoms. Boredom syndrome refers to a person who shows a sense of burnout for a long time, has no psychological strength, boring, emptiness, depression, and other psychological characteristics. This group of people showed escapism, listlessness, indifference to learning and work, inability to find value of their existence, dissatisfaction with anything, and distance from others for a certain period time.

Researchers in the United States and Japan have studied boredom syndrome. Walters (1961) published a report on student apathy. Among the students he tutored, a group of people showed a phenomenon of apparent decline. The specific performance was that these students that had partial retreat reactions were not interested in class, and even refused to go to school. Kasahara (1978) also find that many students have such symptoms in cases of student counseling, he believes this is a new, apathy syndrome to retreat as the main manifestation of withdrawal neurosis.

Boredom syndrome usually has obvious external behaviors and emotional manifestations, which are present in terms of cognition, emotion, will and behavior. For instance, in cognition, they show self-centered and lack of observation; in terms of emotions, boredom individuals often report emptiness, loneliness, and more negative emotions; in the will, they always escape from reality and do not have responsibility; in behavior, there is no enthusiasm for learning and work, even avoiding people. These conditions have negative impacts on the physical and mental development of the individual.

Boredom proneness

Boredom proneness is a relatively long-lasting, personally different and stable, mainly caused by intrinsic motivation. From an individual perspective, boredom tendencies are likely to be closely related to certain personality traits. The current view is that boredom proneness mainly includes external stimulation and internal stimulation (Vodanovich et al., 2005). External stimulation refers to the inclination of individuals to pursue novelty and internal stimulation is the tendency to keep them comfortable while being interested in something.

When developing the Boredom Proneness Questionnaire for college students, the researchers discover that individuals with high boredom proneness are more likely to perceive environmental stimulation as monotonous and constrained, so they tend to use online games to seek freshness and freedom (Huang et al., 2010). People who have high boredom proneness will have the following characteristics: often experience strong loneliness, depression and tension; easy distraction during work or study, and low psychological well-being; lack of intrinsic motivation, large demand for the external environment, poor autonomy (Farmer and Sundberg, 1986).

Boredom state

Some researchers think that boredom can be divided into state-based boredom and trait-type boredom: state-based boredom which caused by specific situations, such as monotonous repetitive work or declining interest, is temporary; trait boredom, however, is long-lasting, even without tedious works (Belton and Priyadharshini, 2007; Musharbash, 2007). State-boredom, also known as responsive boredom or irritating boredom, is an experience of the individual, which leads to such boredom if they have no interest in external stimulation or cognitive skills. Early research on boredom was mainly directed at people who were forced to engage in monotonous work, such as young workers on the factory assembly lines (O'Hanlon, 1981). This state-boredom is similar to mental fatigue and sleep state (Gosline, 2007). Similar research boredom susceptibility represents 'an aversion to repetition, routine, and dull people, and

restlessness when things are unchanging' (Zuckerman et al., 1978:140). While, trait boredom is a state of mind with personal differences also known as chronic boredom or indifferent boredom. It is close to the range of expression of boredom proneness.

Boredom in leisure

Leisure boredom means the individual cannot experience sufficient satisfaction in leisure activities and cannot get the subjective feeling of appropriate awakening (Han, 2012).When individuals are in leisure boredom, this state will be accompanied by negative emotions and cognition, lack of perceived relaxation participation, insufficient level of involvement, and no excitement, change and novel feelings. When an individual perceives that he/she is in comfortable but does not receive feedback, it will create a sense of leisure boredom. Leisure boredom will lead to the individual's participation in leisure activities, feeling meaningless, hopeless and frustrated.

Boredom in psychotherapy

In psychotherapy, boredom can occur between patients and therapists. For example, patients who talk to their feelings or seek opinions can be bored to therapist who is primarily an analytical therapist (Altshul, 1977). Similarly, when the therapist ignores emotional communication with the patient, the therapist will produce boredom emotion, and feel that now is in the 'lay waste of powers' (534), besides that, 'what factors intrinsic to the therapeutic situation itself predispose the therapist to specific responses of boredom' (534). In addition, there are macro boredom and micro boredom in psychotherapy. Macro boredom is caused during a course of treatment, and its essence is 'a malignant countertransference neurosis' (535). Micro boredom, however, appears more frequently. For example, when the therapist is at work, his attention suddenly shifts from the patient's confession to other things.

It can be seen that for the definition of boring, the previous researches involve a wide range and cannot give a definition of recognition, clarity and operability.

The interpretation model of boredom

Two-factor model

In the process of studying boredom, the researcher found that most of the initial researches were similar to O'Hanlon (1981), emphasizing those monotonous activities caused boredom. For the current research, this view is not comprehensive enough, so researchers have proposed a two-factor model. It is found in a survey managed by Ahmed (1990). He marks the factor which shows 'a lack of interest in the environment' (964) is 'apathy' (964), and the other factor is inattention. In a subsequent study, Vodanovich et al. (1997) use a scale to measure boredom in African American college students. The factor analysis detects that the scale was divided into eight dimensions, which can be summarized as internal simulation and external simulation. Gana and Akremi (1998) conducted boredom measurements of French college students and older people, and data analysis marks boredom as internal stimulation and external stimulation.

Gordon et al. (1997) supervise the boredom measurements of undergraduate students and workers in Australia and spot that boredom consisted of two factors, namely, inability to produce interesting activities (internal stimulation) and 'the perception of low environmental stimulation' (Vodanovich et al., 2005:296) (external stimulation). In summary, these studies have verified that boredom is composed of two factors.

Five-factor model

Except the two-factor model, the five-factor model is also well known. Vodanovich and Kass (1990) propose this model when do factor analysis. Five-factor is comprehended to external stimulation, internal stimulation, affective responses, perception of time, and constraint. They perform a factor analysis on BPS, and the results show that the items in the scale can be divided into five dimensions. External stimulation 'assesses the need for sensation seeking' (118), which the main influencing factors depend on the stimulation of the external environment. This dimension illustrates some of the characteristics of boredom tendencies associated with the outside world. Internal stimulation is related to the individual's own internal needs. It involves their entertainments and how to amuse themselves. The third dimension, affective responses, is related to emotions in which mainly correlated to boredom. Perception of time is the individual's perception and control of time in a boredom state. The fifth-dimension constraint, which mainly reflects the individual's reaction in the case of waiting, for instance, a person may respond uncomfortably because of the need to wait, or a person is very patient while waiting.

These two models actually have similarities. The two-factor model expands the concept of external stimulation and internal stimulation, categorizing the other three dimensions of the five-factor model as internal and external stimuli.

Previous researches on boredom

Boredom and attention

In the past, researchers have emphasized the close relationship between boredom and attention when

Figure 1. HEXACO model. H represents Honesty-Humility, E represents Emotionality, X represents Extraversion, A represents Agreeableness, C represents Conscientiousness, and O represents Openness to Experience.
Source: Lee et al. (2004).

defining boredom. Some researchers have introduced Continuous Performance Task (CPT) into the study to measure whether the subject responds to the stimulus. This method requires the subject to respond only to the target stimulus after the detection stimulus appears. If the probe stimulus does not appear before the target stimulus, the subject responds as an error.

Hamilton et al. (1984) detect that because this test requires participants to focus on the stimulus for a long time, he/she experiences more boredom, so individuals with high boredom tendencies are more prone to errors. Cheyne et al. (2009) examined college students' attention deficits and spots that attention deficits improved the boredom index. Danckert and Allman (2005) compare the perception of time in healthy individuals with varying degrees of boredom proneness and discover that individuals with high boredom tendencies are more likely to distract and overestimate time.

Boredom and personality traits

From an individual perspective, boredom is inclined to be closely related to personality traits. Early research on monotonous work has shown that extroverts seem to be more likely to be bored, and their demand for external stimuli is stronger than that of introverts. Culp (2006) uses the HEXACO Personality Inventory (HEXACO-PI; Lee and Ashton, 2004) to explore the boredom tendency (there is the HEXACO model in Figure 1). The results show that external stimulation is significantly negatively correlated with honesty-humility, stable emotionality and conscientiousness. While the internal stimulation shows a positive relationship with extraversion, agreeable and openness. Another study has pointed out that boredom experiences are associated with lower self-fulfillment, life goals, and narcissism (Vodanovich, 2003).

Boredom and negative emotion

Like emotions such as anger and anxiety, boredom can be seen as a specific emotion. According to Pekrun (2006), achievement emotions are described as affective related to achievement end results. In the nine aspects of achievement emotion (including enjoyment, hope, pride, relief, anger, anxiety, shame, hopelessness, and boredom), researchers pay more attention to anxiety, and other types of achievement emotions are ignored, especially boredom. Camacho-Morles et al. (2019) find that adolescents in computer-based collaborative problem-solving activities are obtained those low-capable students in math experienced more anger and boredom. Clinically, boredom and depression, anxiety, is very similar in performance, but the result of psychological measurements shows they are different. Clinically, boredom and depression, anxiety is very similar, but the results obtained by psychometrics show that they are different in essential.

Farmer and Sundberg (1986) thinks that boredom is different from other negative emotions in terms of traits and intensity. Boredom is less intense than depression.

From the environment, boredom is caused by a static environment. As well, Eastwood et al. (2007) find that individuals with high boredom tendencies have the characteristics of alexithymia, their ability to recognize and describe emotions is low, and their perception of the external environment is lower than the population who do not have boredom proneness.

Therefore, the state of boredom is very complicated. In this study, the researcher will define two aspects of boredom: boredom is divided into boredom caused by external stimuli and boredom caused by internal stimuli. The boredom duration of external stimuli is short, and it is a passive state, which is related to the external environment and stimulus; the boredom caused by internal stimuli belongs to the essential characteristics of the individual, and the duration is relatively long and stable. Once an individual can clearly understand the nature of boredom, people can think about ways to eliminate boring and achieve their own goals, especially in education.

Measurement

Previous researchers have designed some boredom scales based on their research fields and objects. This study introduces the scales that are often used in some studies.

Boredom proneness scale

The Boredom Proneness Scale (BPS) is a self-reported scale compiled by Framer et al. (1986), with a total of 28 items. The initial version was a true-false answer for each item and was later revised to the Likert 7-point scale by Vodanovich et al. (1990). It is currently the most widely used and most complete scale in the study of boredom variable. But it also has shortcomings. When many researchers use BPS data for factor analysis, there are cases where the dimensional structure is inconsistent. On the other hand, it is instability that led researchers to discover the two-factor model and the five-factor model. Later, Vodanovich et al. (2005) revised the BPS into 12 questions, divided into two dimensions of external stimulation and internal stimulation, and tested the employees of 787 companies, which proved that the theoretical model was established. The results of Huang et al. (2010) also support this theoretical model, but the difference is that they get the second-order model of the model, including six second-order factors: monotonicity, loneliness, tension, restraint, creativity and self-control.

Boredom proneness questionnaire for college students

The Boredom Proneness Questionnaire for College Students (Huang et al., 2010) is specifically for measuring college students' boredom proneness. It has two dimensions which is mentioned in the research by Vodanovich et al. (2005): internal stimulation (including self-control and creativity) expresses boredom intrinsic motivation and the ability of individual; and external stimulation, including monotonicity, loneliness, tension, and restraint, expresses boredom tendencies to external features and the resulting emotions and behaviors. In this questionnaire, monotony is the most important factor affecting students' boredom. Also, to reach this conclusion: Vodanovich et al. (1997) indicate that the rumpus is an important factor causing individuals' boredom; Ahmed (1990) argues that monotony leads to an individual's lack of interest. In addition, the two dimensions of monotonicity and restraint also reflect the perception of environmental stimuli by highly boredom proneness people. However, there are only two items in this dimension of creativity, which may lead to a decrease in the reliability of the dimension when the researcher uses it.

Learning-related boredom scale

This scale is a subscale related to boredom emotion in the Achievement Emotions Questionnaire (AEQ; Pekrun et al., 2002, 2011). There are 8 items in total and using the Likert 5-point scale for the subjects to choose. Academic boredom is an emotion associated with academic activities or academic achievement.

The boredom susceptibility scale

To evaluate boredom in experience, researcher complied a scale named the Sensation Seeking Scale (SSS; Zuckerman, 1979). In this scale, the most widespread one is the subscale named the Boredom Susceptibility Scale (BS; Zuckerman, 1979). Each of its items has two opposite options for the participants to make a choice. There are two versions of the BS, Form IV and Form V (Zuckerman, 1979). The commonly used version is BS Form V, which has 10 items, distinct with Form IV which has 18 items, each item has two options, and the member who has invited to the survey chooses one of the two options. But this scale can only measure one aspect of boredom (caused by lack of environmental stimulation). Still, this scale is one of the most basic measures to calculate boredom emotions.

Other boredom scales

Single-item measure is a method of measuring boredom that was used by researchers (Shaw et al., 1996). But this method is difficult to achieve desirable levels of its reliability and validity, so it was not often used by

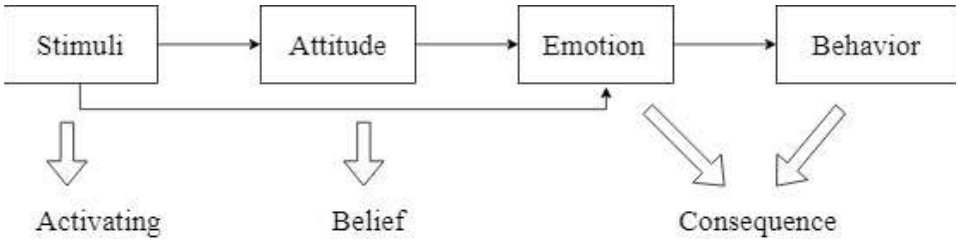

Figure 2. The ABC theory of emotion in this study.
Source: Author.

researchers in the 1990s.

There are some scales to measuring boredom in different fields. The Job Boredom Scale (JBS; Grubb, 1975) is used to measure boredom when working or boredom according to a job. It has two subscales, but it does not give the reliability by the author. Another scale for boredom in job is Lee's Job Boredom Scale (LJBS; Lee, 1986). These two scales primarily assess the boredom of monotonous or repetitive work and both of them show that boredom is negatively significant with job satisfaction. However, in terms of applications, few researchers pay attention to these two scales.

Although the focus of the two scales is on the boredom state of the working situation, more relevant research is needed to test the two scales and determine the scale in practical applications. If they get good proof, these two scales may become important questionnaires in job boredom (Hackman and Oldham, 1976).

There are the Leisure Boredom Scale (LBS; Iso-Ahola and Weissinger, 1990) and the Free Time Boredom Scale (FTB; Ragheb and Merydith, 2001) for researchers to quantify boredom surge from free time. The LBS has 16 items to test people's feeling in their free time and the FTB is mainly to measure boredom in leisure with 33 items. These scales primarily measure how individuals jugged and utilize free time. Vodanovich (2003) points out this scale are better use on population who are jobless or stop working.

The scale for clinical treatment is the Sexual Boredom Scale (SBS) compiled by Watt and Ewing (1996), which is used to measure the sexual boredom experience of individuals in daily life, mainly for clinical treatment and consultation. It has 18 items and uses a 7-point Likert scale.

Judging from the existing boredom scales, the boredom variable has multiple dimensions. So, the researcher suggested that future boredom scales should take into account the various dimensions.

Boredom as an important factor of performance

Boredom is the cause of poor academic achievement. In this part, the researcher shared some relevant theories and research. Thus, the research hypothesis of this study is obtained.

Theoretical basis: ABC Theory of Emotion

There are many theories related to emotions. Breckler (1984) studied and summarized the views and opinions of previous researchers, and believes that the three factors of affection, behavior and cognition constitute attitudes, and these three factors have mutual mediator effects. Breckler's research perspective proves the ABC theory of emotion developed by Ellis (1957). Ellis (1957) believes that the root cause of the individual's bad emotions is not the induced event itself, but the individual's possession of the induced event. It is the basic content of emotional ABC theory. In this theory, A (Activating) represents an induced event; B (Belief) represents the individual's relevant beliefs about the event; C (Consequence) represents the individual's psychological emotions and corresponding behaviors in the event. The individual's belief in the event actually symbolizes the individual's attitude towards the event. Human's emotions are not caused by a certain induced event itself. The generation of emotions requires a process in which stimuli cause individual beliefs and ultimately emotions. In addition, the individual itself will directly generate a certain emotion because of an event similar to the previous experience (Figure 2). In this study, the origin of emotions is stimulation, which is an external condition and is outside the scope of this study. Next, the researcher introduced the relationship between the three variables for attitude, emotion (specifically boredom) and behavior.

Boredom and attitude

Attitude is a learning tendency that is influenced by past experience. Primary school students' poor learning attitudes (such as attitudes toward assignments) can lead to negative emotions that affect their academic achievement (Shang and Qu, 2019). Poor learning attitudes are an important factor in the negative emotions

of students with poor grades (Yu and Dong, 2005).

Boredom and behavior

Boredom as a negative emotion is often associated with problematic behavior, also known as social maladaptive behavior. For example, binge eating, gambling, alcoholism, drug abuse, television or internet addiction. Zhu et al. (2019) conducted a survey of 615 college students and expose that students with high boredom tendencies are more likely to become addicted to the Internet. Besides, negative emotions reduce the frequency of positive behavior. Negative emotions can affect employees' work behaviors, minimize their work behavior and increase their deviate behavior (Rodell and Judge, 2009). Patterson and Pegg (1999) have detected that high boredom minors (especially males) have a tendency to alcoholism. This group of people is at higher risk of depression and who are more likely to commit suicide.

Wegner et al. (2006) inquiry the relationship between casual boredom and risk behavior and obtain a significant positive correlation between the two parts.

Attitude and behavior

Attitudes and behaviors are closely related, which has been proposed by Indoshi et al. (2010). They believe that attitude cannot be expressed directly, but it can be demonstrated through one's behavior. In their study, they used art and design courses to measure five groups of students and find that students would abandon the course in the state of negative emotions or ignore the existence of the course. A positive attitude helps to form good behavior, while a negative attitude can lead to inappropriate behavior (Lee et al., 2015). The negative attitudes of college students can easily lead them to make some negative choices. In addition to affecting students' behavior in learning, this kind of negative attitude also affects their behavior during internships and even work (Eymard and Douglas, 2012; Ferrario et al., 2007).

From that, the researchers proposed that learning attitude of college students can affect one’s boredom, boredom can affect their behavior, and learning attitude can influence students’ learning.

The relationship between the other factors

Boredom and academic achievement: Studies have shown that boredom, or emotions can affect academic achievement. Wenemark et al. (2011) point out those negative emotions can affect an individual's academic achievement. Malekzadeh et al. (2015). introduce the intelligent tutoring systems (ITSs) in the study, which can generate more positive emotions and produce better learning performance. It is because that artificial intelligence technology can adjust students' emotional state to match learning conditions, students will produce good performance (Jaques and Vicari, 2007). Once students have negative emotions (such as boredom) then performance will decline. So, this study proposed that boredom will negatively affect academic achievement.

Attitude and academic achievement: Learning attitude is the internal reaction tendency of learners to affirmative or negative long-term learning. Yukselturk et al. (2018), mention that beliefs and attitudes are two important factors that influence academic achievement. There are studies that prove that learning attitudes can significantly predict that students’ academic achievement. Wang and Che (2005) conducted a study of 122 undergraduate students, and the results reveal that learning attitudes and academic achievement are positively correlated. The better the student's learning attitude is the better academic achievement he/she will achieve. In the nursing profession, negative attitudes will affect the academic achievement of college students (Lee et al., 2015). Muñoz et al. (2016) discover that student's attitudes can influence their future academic achievement and it is also the major to generating emotions.

Therefore, the researchers proposed that learning attitude of college students can positively affect academic achievement.

Behavior and academic achievement: The behavior of college students is significantly related to their academic achievement. Wei et al. (2014) indicate that multi-tasking behavior of mobile phones (including making calls, sending messages, browsing the websites, playing games, browsing social networking sites such as Facebook, etc.) will reduce the quality of lectures and affect academic achievement. The researchers Kuznekoff and Titsworth (2013) divided the students into three groups to organize experiments to control the frequency of their receiving messages. The results show that the test scores of students who did not receive the messages group are significantly higher than the other two groups.

Thus, the researchers proposed that behavior of college students in learning can affect his/her academic achievement.

Framework

In order to study the influence of college students' boring emotions, the researcher combined the above research content to connect boredom; learning attitude, academic achievement and behavior, and draws the research framework of this study (Figure 3). According to theory of emotion, college student's attitude can affect their boring

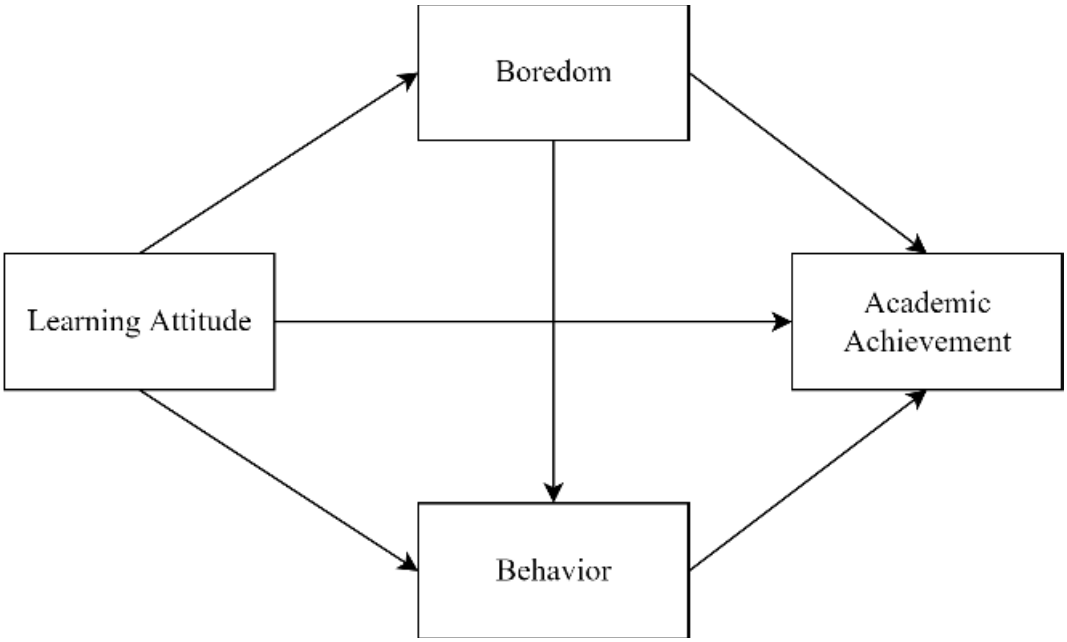

Figure 3. Framework of this research.
Source: Author.

mood, and boredom can affect his/her academic achievement. Not only can that, learning attitude indirectly influence academic achievement through boredom. Similarly, the attitude of learning can affect the behavior of college students, and the behavior of college students can also affect their academic achievement. Learning attitude can indirectly influence his/her academic achievement through the behavior. In the process, boredom will also change the learning behavior of college students.

Boredom state and behavior are two mediators of college students' learning attitude affecting academic achievement.

SUMMARY

Due to time and economic constraints, this study is only in the theoretical research stage. The research hypothesis made in this study can be verified by questionnaire survey in the future research. Learning attitude, boredom, and behavior have mature measurement scales that can be used by researchers. In terms of measuring academic achievement, past researchers often use the student's Grade Point Average (GPA) instead (Lavin, 1965; Pekrun et al., 2010).

Based on an analysis of previous research literature, the researcher discovered a multi-intermediary model. Through this model, it can be known that the factors affecting the academic achievement of college school students are students' learning attitude, boredom and learning behavior, and these three factors also affect each other. Therefore, the decline in college students' academic achievement may be due to students' poor learning attitude, and this negative attitude towards learning has led to boredom state, thus affecting academic achievement. Or the poor learning attitude leads to students' behaviors that are not conducive to learning, which leads to lower academic achievement. In the process, as an emotion, boredom can also lead students to do some behaviors that are not helpful to learning.

In addition to explaining why students' academic achievement is lower, this model can also explain some of the phenomena of students with poor grades. On this basis, this study makes the following inferences: learning attitude of college students can affect one's boredom, boredom can affect their behavior, and learning attitude can influence students' learning. Other than this, boredom will negatively affect academic achievement, learning attitude of college students can positively affect academic achievement, and behavior of college students in learning can affect individuals' academic achievement.

Therefore, thinking about improving college students' academic achievement or avoiding their lower scores can be considered from these aspects. In addition, teachers can use this model to think about whether they will make students bored during the teaching process. And when teachers design a teaching plan, they can make fun as a factor to consider. Encouraging students to take the initiative to learn, changing the boredom state of students from external stimuli, and improving students' academic

achievement, these should be bore in mind to each educator.

CONFLICT OF INTERESTS

The authors have not declared any conflicts of interests.

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