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# A Case Study of Preschool Children's Behavioural Changes in the Application of Gamification Element

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## ABSTRACT

This study explores the usability of gamification element, specifically the use of brag tags, in modifying and enhancing positive behaviours among preschool children in a visual art education setting. Conducted as a case study over a 17-day period, the research focused on two five-year-old students exhibiting the highest incidence of misbehaviour. Through the implementation of personalized interventions, such as altering the learning environment and addressing individual behavioural challenges, the study aimed to determine the impact of gamification on student behaviour. The findings indicate that while both students showed an overall increase in the accumulation of brag tags, the implications of the interventions varied. The results align with previous research highlighting the potential of gamification to mitigate issues with misbehaviour, though its implementation can be influenced by individual needs and the specific gamification elements employed. This study contributes to the understanding of gamification in early childhood education, emphasizing the need for tailored approaches to address behavioural issues and enhance learning outcomes.

**Keywords**: behavioural intervention, gamification, early childhood education

## INTRODUCTION

Early childhood represents a crucial phase in a child's overall development, serving as the bedrock upon which their character and personality take shape before entering adulthood. In this period, managing a child's temperament and behaviour with care is imperative to ensure their core values remain intact. Preschools, as immediate environments after family, play a significant role in influencing a child's behaviour. According to Bronfenbrenner's Ecological Systems Theory, preschools are part of a child's microsystem, exerting substantial influence on their development (Mustafa & Azman, 2013). The integration of gamification elements in education has emerged as a promising approach to enhance learning experiences and foster positive behavioural changes. Gamification, defined as the application of game-like elements in non-game contexts, leverages psychological principles of motivation to engage students and improve their performance (Domínguez et al., 2013). This study aims to investigate the usability of a specific gamification element, "brag tags," on the behaviour of preschool children, focusing on a private kindergarten in Ipoh, Perak. Previous research has shown that gamification can positively influence students' engagement and behaviour. Kayımbaşıoğlu et al. (2016) found that gamification elements such as badges, leaderboards, and avatars help minimize learning distractions and foster basic positive behavioural skills. However, there is a lack of studies specifically examining

the implementation of gamification to influence preschoolers' behaviour. Most existing literature focuses on older students or other educational settings, leaving a gap in understanding how these elements impact young children (Kim & Castelli, 2021). Furthermore, the existing literature tends to focus on classes that teach numeracy and literacy, with a noticeable lack of studies conducted in visual art classrooms. This gap highlights the need for further research to explore the potential of gamification in diverse educational contexts, including visual arts, to provide a comprehensive understanding of its impacts on preschool children's behaviour (Lamrani & Abdelwahed, 2020). Theories of cognitive and behavioural development, such as Piaget's Theory of Cognitive Development and Skinner's Operant Conditioning, provide a theoretical framework for this study. Piaget's theory highlights the egocentric nature of preschool children, which affects their behaviour and interactions (Piaget, 1977). Skinner's theory suggests that positive reinforcement can effectively shape desired behaviours, making it relevant for implementing gamification in a preschool setting (Skinner, 1938). The primary objective of this research is to discover the usability of brag tags in fostering positive behavioural changes in a five-year-old classroom. Specifically, the study aims to discover the usability of brag tags on the students' behaviour. Brag tags are a type of positive reinforcement where students receive a tag for displaying desired behaviours during teaching-learning activities. Positive reinforcement is a system of rewarding a desired behaviour immediately after it occurs to encourage consistent appropriate outcomes (Hardy & McLeod, 2020).

## METHODOLOGY

### Research Design

To explore the usability of a gamification element in influencing preschool children's behavioural changes, a qualitative research approach with an experimental design was used, although the method is uncommon in preschool settings. The experimental design allowed the researcher to study two children - Student TY and Student YH - who were recognized, based on a preliminary assessment, as having the highest incidence of misbehavior in the classroom. These children were acquainted with the notion of "brag tags," which are a gamification element specifically created to encourage positive behaviour for 17 school days. Students who consistently exceeded the daily behavioral objectives were given brag tags as recognition.

### Participants

The study involved two children aged five years old from a private urban kindergarten in Ipoh, Perak. According to a preliminary assessment, these two children exhibited the highest incidence of challenging behaviours, and therefore this was considered purposive sampling.

### Instruments

Classroom behaviours were systematically observed and recorded for roughly four hours each day utilizing video recordings, observation checklists adapted from Wangdi and Namgyel (2022), and a written daily log. The collected data were subsequently quantified and presented in a table and a line graph to visually depict the frequency and patterns of behaviour. Further details about Student TY's medical history were obtained from the former homeroom class teacher (when the child was four years old) and his parents via a teacher-parent portal called LittleLives App. Consent from parents or caregivers was obtained, and ethical guidelines were followed. This combination of quantitative and qualitative analyses provided a comprehensive understanding of the usability of the brag tag system in modifying student behaviour, leading to well-supported conclusions about its impact.

**Data Analysis**

The data analysis process aimed to comprehensively evaluate the usability of the brag tag gamification element in influencing preschool children's behavioural changes. The analysis was primarily qualitative, with quantitative components to support the findings.

**Thematic Analysis**

The primary method used for data analysis was thematic analysis. Data from classroom observations, video recordings, and the researcher's daily logs were transcribed and systematically coded. Thematic analysis involved identifying recurring themes and patterns related to changes in student behaviour. This approach helped to uncover underlying trends and insights regarding how the brag tag system impacted the students' actions and responses.

**Themes Identified**

Several key themes emerged from the thematic analysis of the data are illustrated in the following table;

**Table 1** *Thematic Analysis of the Data*

| Theme | Description |
|---|---|
| Increased Engagement | The brag tag system significantly increased student engagement in classroom activities. Students were more motivated to participate and complete tasks to earn brag tags. |
| Positive Reinforcement | The use of brag tags as a reward system provided positive reinforcement, encouraging desirable behaviours and reducing disruptive ones. The recognition of good behaviour through tangible rewards was effective in promoting behavioural change. |
| Individualized Interventions | Tailored interventions based on individual student needs were crucial in achieving positive outcomes. Adjustments in the learning environment and personalized support helped address specific behavioural challenges. |
| Behavioural Improvement | There was a noticeable improvement in specific behaviours, such as increased focus and reduced disruptive actions. The frequency of certain negative behaviours decreased over the intervention period. |
| Consistency and Sustainability | The consistent application of the brag tag system and ongoing monitoring were essential for sustained behavioural change. Regular feedback and reinforcement helped maintain positive behaviours. |
| Emotional and Social Development | The intervention not only improved classroom behaviour but also contributed to the students' emotional and social development. Students learned to cooperate, resolve conflicts, and support each other. |
| Challenges and Limitations | Some behaviours were more resistant to change, highlighting the limitations of gamification alone. The need for additional support and strategies for certain students was evident. |

**Quantitative Analysis**

While the main focus was on qualitative data, some quantitative measures were also employed to support the analysis.
These included:

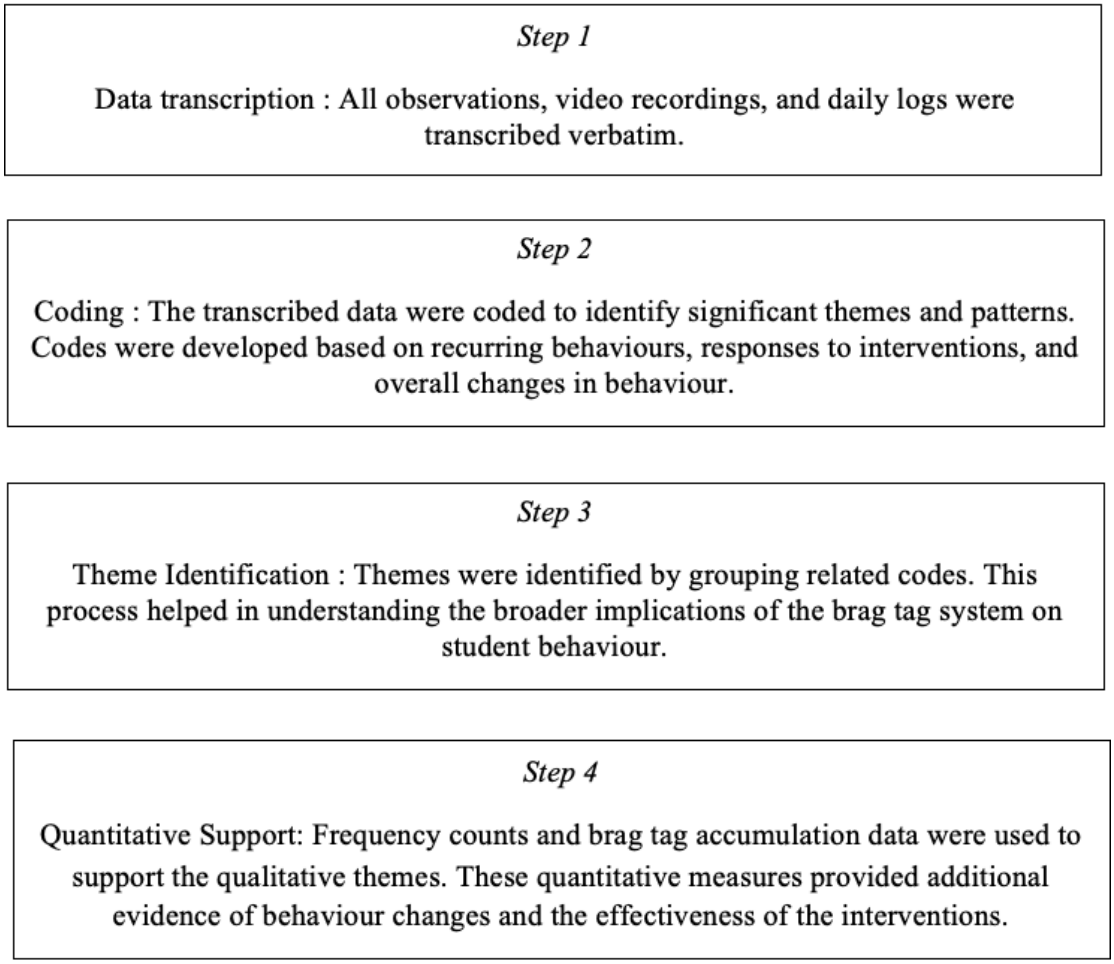
**Table 2** *Quantitative Analysis*

| Quantitative Measures | Description |
|---|---|
| Frequency Counts | The frequency of specific disruptive behaviours was recorded and tabulated to provide a clear picture of how often these behaviours occurred before, during, and after the intervention. |
| Brag Tag Accumulation | The number of brag tags earned by each student was tracked over the 17-day period. This data was plotted on a line graph to visually depict the progress and trends in behaviour modification. |

## Integration of Data

The integration of qualitative and quantitative data provided a comprehensive understanding of the impact of the brag tag system. The thematic analysis offered detailed insights into the nature of behavioural changes, while the quantitative data supported these findings by highlighting specific trends and patterns. Figure 1 illustrates the analysis process:

**Figure 1** *The Analysis Process*



## RESULTS

The purpose of presenting the data is to identify the primary behavioural patterns observed in the classroom and to evaluate any changes resulting from the gamification intervention. According to the adapted teacher observation checklist (Wangdi & Namgyel, 2022), six types of disruptive behaviours were monitored: (1) looking outside the window or staring into space, (2) arriving late, (3) talking in class, (4) laughing or shouting, (5) drawing unnecessary pictures, and (6) shifting from one chair to another or sitting improperly.

### Observed Disruptive Behaviours

Despite the intervention, Student TY consistently exhibited the disruptive behaviour of shifting from one chair to another, while Student YH frequently misbehaved by talking in class. However, the other disruptive behaviours were manageable and controlled with the intervention, resulting in occurrences of less than 30%.

**Table 3** *Disruptive Behaviours Presented Throughout the Observation Period*

| Day | Looking outside the window | | Late comers | | Talking in the class | | Laughing/shouting | | Drawing unnecessary pictures | | Shifting from one chair to another/ sitting improperly | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TY | YH | TY | YH | TY | YH | TY | YH | TY | YH | TY | YH | |
| 1 | | | | | √ | | | | | | √ | | YH was absent |
| 2 | | | | √ | √ | √ | | | √ | | √ | | |
| 3 | | | | | | √ | | | | | √ | | |
| 4 | | | | | √ | √ | | √ | | | √ | | |
| 5 | | | | | | | | | | | √ | | YH was absent |
| 6 | | | | | | | √ | | | | √ | | |
| 7 | | | | | | √ | | √ | | | √ | √ | |
| 8 | | | | | | √ | | | | √ | √ | | |
| 9 | | | | | | | | | | | √ | | |
| 10 | | | | | √ | √ | √ | | | | √ | √ | |
| 11 | | | | | | √ | | | | | √ | | |
| 12 | | | | √ | | | √ | | | | √ | | |
| 13 | | | | √ | | √ | | √ | | | √ | | |
| 14 | | | | √ | | √ | | | | | √ | | |
| 15 | | | | | | √ | | √ | √ | | √ | | |
| 16 | | | | | | | | | | | √ | | YH was absent |
| 17 | | | | | √ | √ | | | √ | | √ | | |
| Total | 0 | 0 | 0 | 4 | 5 | 11 | 3 | 4 | 3 | 1 | 17 | 2 | |

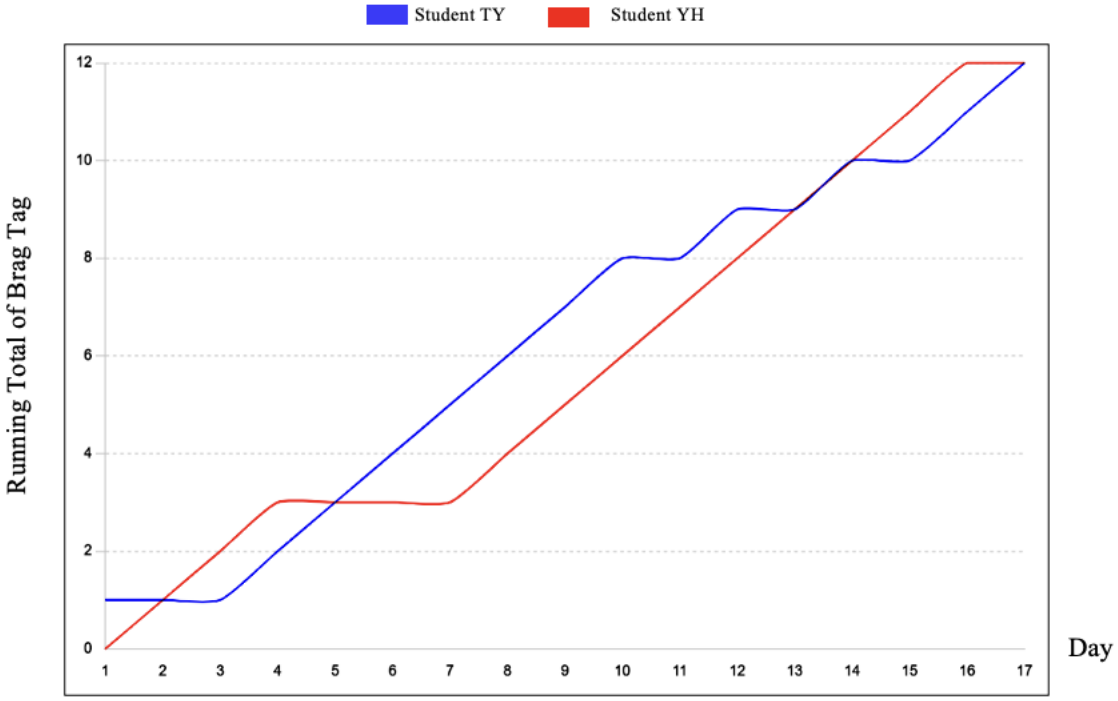
**Table 4** *Disruptive Behaviours Presented in Percentage Throughout the Observation Period*

| Behaviour | Student TY | | Student YH | |
|---|---|---|---|---|
| | Frequency | Percentage (%) | Frequency | Percentage (%) |
| Looking outside the window | 0 | 0 | 0 | 0 |
| Arriving late | 0 | 0 | 4 | 24 |
| Talking in the class | 5 | 29 | 11 | 65 |
| Laughing/shouting | 3 | 18 | 4 | 24 |
| Drawing unnecessary pictures | 3 | 18 | 1 | 6 |
| Shifting from one chair to another | 17 | 100 | 2 | 12 |

## Brag Tag Accumulation

Figure 1 illustrates the running total of brag tags that the two students, TY and YH, received over a 17-day period. Student TY (indicated by the blue line) demonstrates a steady increase with some fluctuations, ending at a total of 12 brag tags. Comparatively, Student YH (indicated by the red line) shows a strong positive trend after initial fluctuations, and it also ends at a total of 12 brag tags.

**Figure 2** *Running Total Of Brag Tag Throughout the Observation Period*




Initially, Student TY starts with a slight increase in earning the brag tags, while Student YH shows an early surge in Days 2-4. However, Student YH experienced a phase of no brag tags earned around Days 5-7. From Day 8 on, both Student TY and Student YH show a significant and consistent increase in collecting the brag tags. Student YH's rapid accumulation from Days 8–17 suggests a strong and steady improvement in behavior. Student TY also demonstrates improvement, but with a few minor fluctuations, especially around Days 11 and 13.

## Specific Interventions and Behavioural Changes

During the observation period, several interventions were made to improve the behavioural challenges faced by the two students, based on video footages and the researcher's daily journal. For example, Student TY was found to have eczema, leading to discomfort and focus issues. Specific incidents such as scratching and not sitting properly were observed. Student TY's parents and the previous homeroom class teacher verified his medical history. Given this situation, interventions such as altering the learning environment by sitting under an air conditioner or fan, implementing physical comfort measures like applying cream and tepid sponging, and providing flexible seating options were proposed. Positive responses to interventions are reflected in the overall upward trend in brag tags. Minor fluctuations suggest some days were more challenging despite interventions. On the other hand, Student YH was initially observed to show a lack of participation and experience class conflicts. She also had issues with staying hydrated and completing tasks. One-on-one conversations were initiated to enhance the brag tag practice, eliciting a promise from Student YH to improve, in addition to implementing interventions that addressed conflict resolution and seating adjustments. Motivational tactics like flashing the brag tag and giving encouraging looks seemed to improve Student YH's behaviour. As a

result, there was significant improvement in behaviour post-interventions, as evidenced by the consistent rise in brag tags from Day 8 onwards. Student YH showed a steady accumulation of brag tags, indicating sustained positive behaviour and effective intervention.

## DISCUSSION AND IMPLICATION

The effectiveness of these gamification elements, such as badges (brag tags), aligns with the findings of Mese and Dursun (2019), who noted that while there was no significant difference in cognitive, social, and teaching presence, qualitative data revealed that gamification positively influenced motivation. In this context, the motivation is reflected in the behaviours exhibited by both Student TY and Student YH. Similarly, Luo (2021) highlights that the effectiveness of gamification varies and is influenced by factors like the type of game elements used and their alignment with learners' psychological needs. In this case, the interventions for Students TY and YH were tailored to their individual needs, which may have contributed to the positive outcomes observed. The use of specific strategies like conflict resolution and personalized comfort measures reflects Luo's framework identifying critical factors for successful gamification, such as adaptation, reward, and challenge. Furthermore, the study corroborates findings from Alsaleh and Alnanih (2020), which emphasized the role of gamification in behaviour modification, particularly in fostering positive behavioural changes in children.

The mixed results observed in the study, where some behaviours were more resistant to change, echo the sentiments expressed by Kaplan et al. (2021) regarding the need for a multi-faceted approach in educational interventions. These findings suggest that while gamification can be an effective tool for behaviour modification, it should be part of a broader strategy that includes personalized interventions and continuous monitoring. The theoretical framework incorporating Piaget's Theory of Cognitive Development, Skinner's Operant Conditioning, the Applied Behaviour Analysis (ABA) Model, and the ADDIE Model provides a robust foundation for understanding and exploring these dynamics. By incorporating Piaget's insights into classroom activities, Early Childhood Care Education (ECCE) educators can create learning environments that align with children's cognitive abilities, thereby fostering better engagement and understanding. The application of gamification elements follows Skinner's Behavioural Learning Theory (Operant Conditioning), where behaviours are strengthened or weakened by the consequences that follow them. The ABA Model provides a framework for comprehending the behavioural changes influenced by gamification elements through the antecedent-behaviour-consequence sequence. The ADDIE instructional design model ensures a systematic approach to developing and implementing the gamification elements.

## CONCLUSION

The utilization of the Brag Tag system, in conjunction with focused interventions, has proven to be successful in fostering and enhancing favourable conduct in students. The increasing patterns in the cumulative count of Brag Tags indicate the effectiveness of the system. Tailored interventions targeting specific behavioural issues and demands, such as Student TY's eczema and Student YH's engagement, were instrumental in the reported enhancements. This suggests that the brag tag system may not be universally adaptable for all students and highlights the need for a more individualized approach or additional support for certain students. Moreover, the consistency of certain disruptive behaviours, as evidenced by the case study, suggests that some behaviours might be more resistant to change through gamification alone. The results imply that gamification strategies like brag tags can be a good effort in modifying students' behaviour, but their success may vary depending on individual student characteristics and the nature of the disruptive behaviour. Therefore, persistent implementations of these strategies should be taken on board to endure favourable results. The Brag Tag system will be continued and adapted, with consistent monitoring and adjustment of actions based on continuous behavioural observations. For future implementation, it is recommended that other behavioural interventions are combined with gamification to address more persistent disruptive behaviour. Furthermore, students who

do not respond to gamification alone need to be additionally supported and provided with adjusted strategies as necessary.

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