**Student Behavior Tracking Applications in Middle School and High School**

BKeeper

Abdoul Karim Konate, Project Manager

Manuel Gonzalez, Front-End

Jongho Park, Back-End

Department of (CISE), University of Florida

CIS-4914: Senior Project

Dr. Alexandre Gomes ([agomesdesiqueira@ufl.edu](mailto:agomesdesiqueira@ufl.edu))

September 9, 2023

**Abstract**

Behavior problems affect students learning experience and takes valuable time from educators. BKeeper is a website designed for middle schools and high schools, where the behavior of the students can be tracked, automating the actions taken when bad or good behavior is encountered, and providing tools to analyze the behavior of the students. By automating the actions taken for behavior incident in the schools, BKeeper is giving the school staff more time to work on other tasks. At the same time, the data is collected, and displayed to school’s staff, to customize the actions taken for certain behavior or intervene when necessary.

**Table of Contents**

Introduction 4

Objectives 4

Literature Review 5

Student Misbehavior 5

Behavior Interventions in the Classroom 6

Proposed Work 8

Project Overview 9

Technology and Language Used 9

Analytical Techniques 10

Project Plan 10

Conclusion 11

References 12

**Introduction**

Student behavior in the classroom has an impact on the quality of education they receive. Studies have shown that misbehavior can lead to a student withdrawing from school academically and socially (Cline et al., 2023; Hester et al., 2003; Naz et al., 2022). It can also lead to teacher burnout as they struggle to manage misbehaviors and teach a classroom full of students (Grayson & Alvarez, 2008). School districts work to find solutions to this problem by implementing various disciplinary methods, and behavioral intervention tools.

BKeeper proposes a solution unlike the tradition way of behavior interventions with mountains of paperwork. By using collected data relevant to student behavior, such as attendance, grades, and infractions (misbehavior instances), the platform will be instrumental in helping teachers, administrators, or counselors take educated and actionable decisions to help students with behavioral issues. With BKeeper, the users would be able see their standing (this would be the only option for students), to add new metrics, and make educated decisions regarding students with behavioral issues. Furthermore, BKeeper will allow its users, with the help of the appropriate authority, to address behavioral issues at the root. BKeeper will use deferent metrics to determine the overall severity of student behavior and suggest actions to take to both the student and the teacher.

As expressed in the literature review, there are some technological tools that exist and are useful, but none of them are as comprehensive as BKeeper. BKeeper would be the optimum, all-encompassing behavior intervention tool for schools.

In this proposal, we will talk about the objectives, benefits and propose a work plan and technical stack we will use to implement BKeeper while relying on research and existing works.

**Objectives**

**Goal 1:** In this step our main goal is to improve student behavior in the classroom.

**Objective 1:** In this step our main goal is to track student behavior by using metrics such grades, latency, and infractions.

**Objective 2:** In this step our main goal is to notify Students/Teacher/Admins about behavior and assigned behavior intervention actions.

**Goal 2:** Provide usable and effective tool for teachers and school administrators.

**Objective 1:** In this step our main goal is to have automated and customizable actions based on a point system.

**Objective 2:** In this step our main goal is to display necessary data points as chart for better data visualization.

**Literature Review**

**Student Misbehavior**

Managing student behavior in the classroom is essential to ensuring a positive and effective learning environment. When students feel that they are successful in school, have positive relationships with their peers and teachers, and are able to participate in school activities they are less likely to drop out of school (Lehr et al., 2004). Student behavior has a wide impact on their ability to be engaged with their school. Discipline can lead to them being removed from extra-curriculars, minimizing their interactions with peers, and in-general disassociating them from the school culture. Research has found that factors such as student behavior, attendance, and academic success has an impact on disengagement and potential future drop out (Hester et al., 2003; Lehr et al., 2004; Li & Xue, 2023; Naz et al., 2022).

Hester et al. (2003) mentions four categories of misbehavior: “1) goofing off, 2) class disruptions, 3) defiance of authority, and 4) aggression” and states the importance of recognizing these misbehaviors as part of a larger school climate and their impact on classroom instruction (131). Research into factors impacting student behavior, learning, and motivation support this idea of creating a positive learning environment (Naz et al., 2022). Outside of family influence on students’ behavior, Naz et al. (2022) finds that “educational factors such as teachers’ insulting behavior, teasing and abusive behaviors in the classroom…de-motivate students for their studies” and can lead them to “behave roughly” (60).

Teachers see their time managing student misbehavior as time taken away from classroom instruction, which negatively impacts all students in the classroom (Grayson & Alvarez, 2008; Jayawardena, 2021). In fact, research has found that school climate, school administrator policies on discipline, and ability to manage student behavior are factors that lead to teacher burnout (Grayson & Alvarez, 2008). Creating a school climate that supports students and teachers, successfully applies behavior interventions or discipline, and encourages engagement leads to improved academic success for students (Grayson & Alvarez, 2008; Hester et al., 2003; Jayawardena, 2021; Lehr et al., 2004).

**Behavior Interventions in the Classroom**

***Common Models of Discipline***

There are different types of discipline that schools utilize to manage student misbehavior that can be grouped into three categories—corporal punishment, exclusionary discipline, and restorative interventions (Hester et al., 2003; Jayawardena, 2021). Corporal punishment is not widely used in the United States, so will not be discussed in this literature review. Exclusionary discipline is most familiar and include interventions such as time outs, suspensions, removal from extra-curricular activities, and expulsion. On the other hand, restorative interventions attempt to address misbehavior without excluding students from their peers or school activities, such as holding conferences or engaging in an activity to correct the infraction (Jayawardena, 2021). Studies have found that discipline practices that minimize student exclusion from the classroom and school may be the most beneficial in the long-term (Bruhn A. L. et al., 2016; Bruhn et al., 2015; Campbell & Anderson, 2011; Cline et al., 2023; Hester et al., 2003; Sarno Owens et al., 2012; Sottilare & Kwang-Sun Cho, 2023). However, not all teachers feel they are prepared by their school districts to implement alternative forms of discipline or that there is a school climate promoting this type of intervention (Cline et al., 2023; Kirkpatrick et al., 2022).

***Restorative or Alternative Discipline Methods***

One form alternative discipline is prevention through self-monitoring interventions. A systematic review of selected programs found that a self-monitoring system was successful in decreasing misbehaviors in the classroom (Bruhn et al., 2015). However, it is important to note that certain components of the interventions need more study to determine effectiveness—reinforcement of self-assessment, feedback, attaching functional interventions based on feedback (Bruhn et al., 2015).

A system more schools are implementing is the Check-in/Check-out (CICO) three tier system. Tier 1 involves having school-wide behavior expectations, Tier 2 involves interventions targeted to students in need, and Tier 3 is a more intensive level of intervention for severe misbehaviors. Under CICO, targeted students have a morning and afternoon check-in with a school professional to first set goals for the day and then to assess success in achieving those goals (Bruhn et al., 2015; Sottilare & Kwang-Sun Cho, 2023). CICO has been found to be effective in providing behavior reflection and correction to students and helps build positive associations with adults and school (Bruhn et al., 2015). It is important to mention that there is a potential effect of students that engage in attention-seeking behaviors that exploit these types of interventions to gain attention from adults (Bruhn et al., 2015; Kirkpatrick et al., 2022; Sottilare & Kwang-Sun Cho, 2023). Like CICO, a Daily Report Card (DRC) was also a successful tool to prevent and intervene with misbehavior. Although, it is important that students are involved in the goal setting to enhance the impact of the intervention (Bruhn et al., 2015; Sarno Owens et al., 2012).

***Technology Based Interventions***

The development of technology and has allowed schools to implement digital technologies for student behavioral interventions. Kirkpatrick et al. (2022), conducted an analysis of schools implementing different existing software that provided behavior interventions in the form of a class economy point system, student self-monitoring and assessment, and goal setting. The results found that the program using the point system was successful in reducing the number of low and mid-level disruptions, such as talking out of turn. However, the self-assessment program did not show viable success in reducing misbehavior (Kirkpatrick et al., 2022).

There are more advanced forms of technology being used like motion sensors and monitoring systems. One review of a monitoring system was able to detect recognition of classroom behaviors. However, it was limited in interpreting changes in behavior after long periods of time of monotonous behavior, such as note-taking (Wang et al., 2023). A review of another system that utilizes deep learning algorithms was able to “monitor students’ behavioral and emotional pattern…detecting student behavior, emotions, attendance, and progress statistics”, which helped teachers in decision making (Trabelsi et al., 2023, p. 15). There is potential future use of this type of technology to enhance current intervention practices in schools (Trabelsi et al., 2023; Wang et al., 2023).

**Proposed Work**

**Proposal Overview**

The BKeeper project intends to be an effective tool for school districts to implement in their classrooms. It will bring necessary support, guidance, and data to assist in classroom management from all levels, teachers to administrators. BKeeper bring its users an interface that is both user friendly and informational. The interface would incorporate data visualization in order for the user to quickly understand the data. To accomplish data collection and visualization, in both back-end and front-end, BKeeper will user various technologies and languages.

**Technologies and Languages Used**

1. **JavaScript:** JavaScript is used as the main programming language for both front-end and back-end development. Enables the creation of dynamic and interactive web applications.
2. **HTML:** HTML is essential for structuring web content, defining the layout of applications, and creating user interfaces.
3. **CSS:** CSS is used to style the application and ensures a visually appealing and user-friendly design.
4. **MongoDB:** MongoDB is used as a NoSQL database to efficiently store and manage data. Provides flexibility and scalability for data storage.
5. **Node.js:** Node.js is used as an execution environment for server-side JavaScript. Enables the development of fast and scalable backend services.
6. **Postman:** Postman is used for API testing and validation. Enables thorough testing of API endpoints and their functionality.
7. **MongoDB Compass:** MongoDB Compass provides a graphical user interface for MongoDB. It supports database management, querying and data visualization.
8. **Mailtrap:** Mailtrap is used as a testing environment for email communications. Test email functionality without sending emails to actual recipients**.**
9. **ESLint:** ESLint is a static code analysis tool that helps maintain code quality and adherence to coding standards.

**Analytical Techniques**

1. **Data analysis:** MongoDB stores project related data. Analytics technologies will query and analyze this data to extract valuable insights, track user behavior, and make data-driven decisions.
2. **Performance analysis:** We will analyze code quality and application performance using tools such as ESLint and Node.js profiling to identify bottlenecks and areas to optimize.
3. **User Experience Analytics:** We will collect and analyze user interactions, click-through rates, and other indicators of user behavior to improve the user experience of our application.
4. **API Testing and Analysis:** We will use Postman to test and validate API endpoints to ensure robust functionality and error handling.
5. **Email Analytics:** We will use Mailtrap to evaluate the effectiveness of your email campaigns by tracking email delivery rates, open rates, and click-through rates.
6. **Database Analysis:** We will use the MongoDB Compass to visually explore and query the MongoDB database to extract useful information and insights.

**Project Plan**

**Phase 1: Develop Initial User Interface (UI)**

We plan to begin the development of the user interface (UI) for school administrators/teachers and students by October 1, 2023. This will include the user account creation and login system, which will be different depending on user role—school staff or student. We will also design the landing pages for these roles upon successful account creation and login.

**Phase 2: Develop System Actions**

Phase 2 we intend to complete by October 29, 2023. We will create the various implementation systems for the system: behavior tracking, notification system, alerts, graph visuals based on collected data, automated intervention system, and the integration of tools in the UI for roles.

**Phase 3: Full UI Implementation**

Phase 3 we intend to complete by November 19, 2023. In this phase, we will focus on having full implementation of UI for all three roles—school administrator, teacher, and student.

**Phase 4: Product Testing**

Phase 4 we intend to complete by December 3, 2023. In this phase we will be conducting full product testing and validation. We will also be adjusting features or creating additional features based on product development and feedback.

**Phase 5: Production Completion**

We intend to have a complete product ready for deployment by December 6, 2023.

**Conclusion**

Student behavior in school is a crucial component of their overall educational success. As stated in the literature review, studies show the need for proper behavior intervention tools that could help students’ success and alleviate teachers’ stress so they can focus on what really matters—learning. BKeeper will bring to the schools a platform that will help faculty and administrators manage students’ behavior by using data. BKeeper will give teachers the tools they need to make educated and impactful decisions. This will result in reduction of instances of student misbehavior, and an improvement in classroom management.

# **References**

Bruhn, A. L., McDaniel, S. C., Fernando, J., & Troughton, L. (2016). Goal-setting interventions for students with behavior problems: A systematic review. *Behavioral Disorders, 41*(2), 107-121.

Bruhn, A., McDaniel, S., & Kreigh, C. (2015). Self-monitoring interventions for students with behavior problems: A systematic review of current research. *Behavioral Disorders, 40*(2), 102-121.

Campbell, A., & Anderson, C. M. (2011). Check-in/check-out: A systematic evaluation and component analysis. *Journal of Applied Behavior Analysis, 44*(2), 315-326.

Cline, E., Lingle, L., Ippolito, M., Ksiazek, K., & Al-Bataineh, A. (2023). Responsive classroom curriculum and its impact on student behavior. *The Turkish Online Journal of Educational Technology, 22*(1), 191-205.

Grayson, J. L., & Alvarez, H. K. (2008). School climate factors relating to teacher burnout: A mediator model. *Teaching and Teacher Education, 24*(5), 1349-1363.

Hester, P., Gable, R. A., & Manning, M. L. (2003). A positive learning environment approach to middle school instruction. *Childhood Education, 79*(3), 130-136.

Jayawardena, N. S. (2021). The role of culture in student discipline of secondary schools in cross-cultural context: A systematic literature review and future research agenda. *The International Journal of Educational Management, 35*(6), 1099-1123.

Kirkpatrick, M., Rivera, G., & Akers, J. (2022). Systematic review of behavioral interventions using digital technology to reduce problem behavior in the classroom. *Journal of Behavioral Education, 31*(1), 69-93.

Lehr, C. A., Johnson, D. R., Bremer, C. D., Cosio, A., & Thompson, M. (2004). *Essential Tools: Increasing Rates of School Completion: Moving From Policy and Research to Practice.* National Center on Secondary Education and Transition.

Li, J., & Xue, E. (2023). Dynamic interaction between student learning behavior and learning environment: Meta-analysis of student engagement and its influencing factors. *Behavioral Sciences, 13*(1), 1-15.

Naz, S., Rasheed, T., & Rasheed, S. (2022). Investigating factors of social behaviour affecting students' motivation and learning achievement. *Journal of the Research Society of Pakistan, 59*(2), 60.

Pierce, C. D., Reid, R., & Epstein, M. H. (2004). Teacher-mediated interventions for children with EBD and their academic outcomes: A review. *Remedial and Special Education, 25*(3), 175-188.

Sarno Owens, J., Holdaway, A. S., Zoromski, A. K., Evans, S. W., Himawan, L. K., Girio-Herrera, E., & Murphy, C. E. (2012). Incremental benefits of a daily report card intervention over time for youth with disruptive behavior. *Behavior Therapy, 43*(4), 848-861.

Sottilare, A. L., & Kwang-Sun Cho, B. (2023). Implementation of check-in/check-out to improve classroom behavior of at-risk elementary school students. *Behavioral Sciences, 13*(3), 257.

Trabelsi, Z., Alnajar, F., Medha Mohan, A. P., Gochoo, M., & Luqman, A. (2023). Real-time attention monitoring systems for classroom: A deep learning approach for student's behavior recognition. *Big Data and Cognitive Computing, 7*(1), 1-17.

Wang, H., Gao, C., Fu, H., Zong-Hao Ma, C., Wang, Q., He, Z., & Li, M. (2023). Automated student classroom behaviors' perception and identification using motion sensors. *Bioengineering, 10*(127), 1-17.

Young, J., Park, S., & Lim, E. (2018). Factors influencing preservice teachers' intention to use technology: TPACK, teacher self-efficacy, and technology acceptance model. *Journal of Educational Technology & Society, 21*(3), 48-59.